MARCH 4, 1996 VOLUME 13, NUMBER 10

NetworkWorld

THE NEWSWEEKLY OF ENTERPRISE NETWORK COMPUTING

RISKY BUSINESS?

US WEST bets billions on cable TV to extend network reach.
Page 10.

Network Notes is dead

By Joanie Wexler
Basking Ridge, N.J.

Two years ago, rumors of the service more than doubled Lotus' stock price. Some called it the next information superhighway. An AT&T executive told *The Wall Street Journal* it could produce $2 billion in revenue a year by 1997.

But after untold millions in investment, AT&T Network Notes attracted a paltry number of customers. So with Lotus Development Corp. officials biting their nails, AT&T last week unceremoniously killed off its public Notes service — a scant eight months after it went live.

And while AT&T did not even have an official Internet strategy until last June, the carrier said it ditched Notes to concentrate on 'Net offerings.

AT&T officials sidestepped the question of weak revenues, instead pasting Network Notes with what has become a dirty industry word — proprietary.

What proprietary means here, observers said, is that AT&T built its Notes network

See **Network Notes,** *page 69*

Will GroupWise ship or slip?

By Carol Sliwa
Orem, Utah

Lotus Development Corp.'s new version of Notes is out, and Microsoft Corp. finally looks ready to end the glacial testing period for its Exchange Server. So the focus is shifting to the other major player in the groupware marketplace — Novell, Inc.

A peek at Microsoft's Exchange pricing. Page 69.

Will Novell's GroupWise XTD, a client/server-based groupware offering with database replication, make it out of the blocks in time? If it does, many observers will be shocked.

See **GroupWise,** *page 69*

Net control is new OLE goal

Microsoft object management spec to challenge SNMP.

By Kevin Fogarty
Redmond, Wash.

Microsoft Corp. is preparing an object-oriented framework it hopes will revolutionize network and systems management.

The company is creating OLE-based objects for management that it wants vendors to link to all of their important hardware devices and applications.

If successful, the OLE plan would give OLE-enabled management applications an unprecedented level of control over not only networked devices, but also individual components such as hard drives, according to sources briefed by Microsoft.

The strategy also lays the groundwork for Microsoft to shift its Systems Management Server (SMS) tool into a full-

See **OLE,** *page 68*

Grab more Microsoft info on Network World Fusion, including:
- **An article on its plans for Network OLE**
- **A look at delays in its SMS management platform.**

Select News+ then Front Page.

NetworkWorld Fusion
http://www.nwfusion.com

Special section

The switching imperative

How LAN switching is reshaping the corporate network and what you should do about it.

Coverage begins on page 44.

1-888-FLOWERS...going once, twice and sold!

By Tim Greene
Washington, D.C.

Congress is mulling whether to put newly minted toll-free 888 vanity telephone numbers up for auction, a move that could generate a projected $750 million to help fight the federal debt.

But users with 800 vanity numbers think that's unfair because it is their advertising that gives the equivalent 888 numbers value in the first place. If the 888 numbers are auctioned, users fear rivals and speculators will start high-stakes bidding wars. That could make it costly for 800-number owners to capture the 888 twins or even rob them of their advertising investments.

The more successful a user's advertising effort, the higher the value of the number. That means the user ends up being punished for having done a good job, said Colleen Boothby, a Washington, D.C. attorney who represents the 800 Users Coalition.

DO THE MATH

Congress is weighing an auction of toll-free 888 vanity numbers.

Expected revenue:	$750 million
Total 888 numbers to be auctioned:	÷ 350,000
Average price per number:	$2,142.86

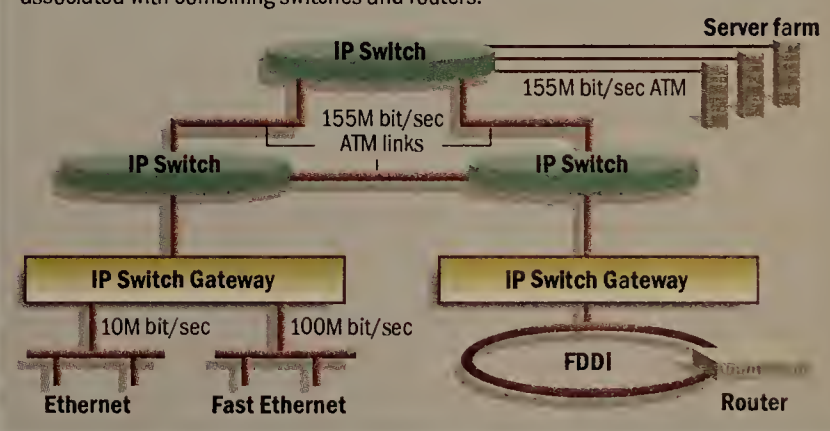
When the new toll-free code became functional last Friday, about 350,000 vanity numbers were set aside by the Federal Communications Commission at the request of those who hold their 800 equivalents.

The FCC has not decided yet how to dispense them, but a

See **888 numbers,** *page 68*

HOW'S THIS FOR A SWITCH?

Ipsilon's IP Switch and IP Switch Gateways let users connect existing LANs to an ATM backbone and run IP applications over it. This eliminates the bottlenecks and complexities associated with combining switches and routers.



Start-up takes new IP route

By Jim Duffy
Palo Alto, Calif.

This is where the big boys would like to be.

Officials from some well-known internetworking firms have created a company ready to tackle the tough problem of building high-performance IP networks that avoid the bottlenecks of traditional routers.

At Ipsilon Networks, Inc.'s coming-out party last week, the company took the wraps off a switching platform that combines the intelligence of IP routing with the speed of Asynchronous Transfer Mode switching.

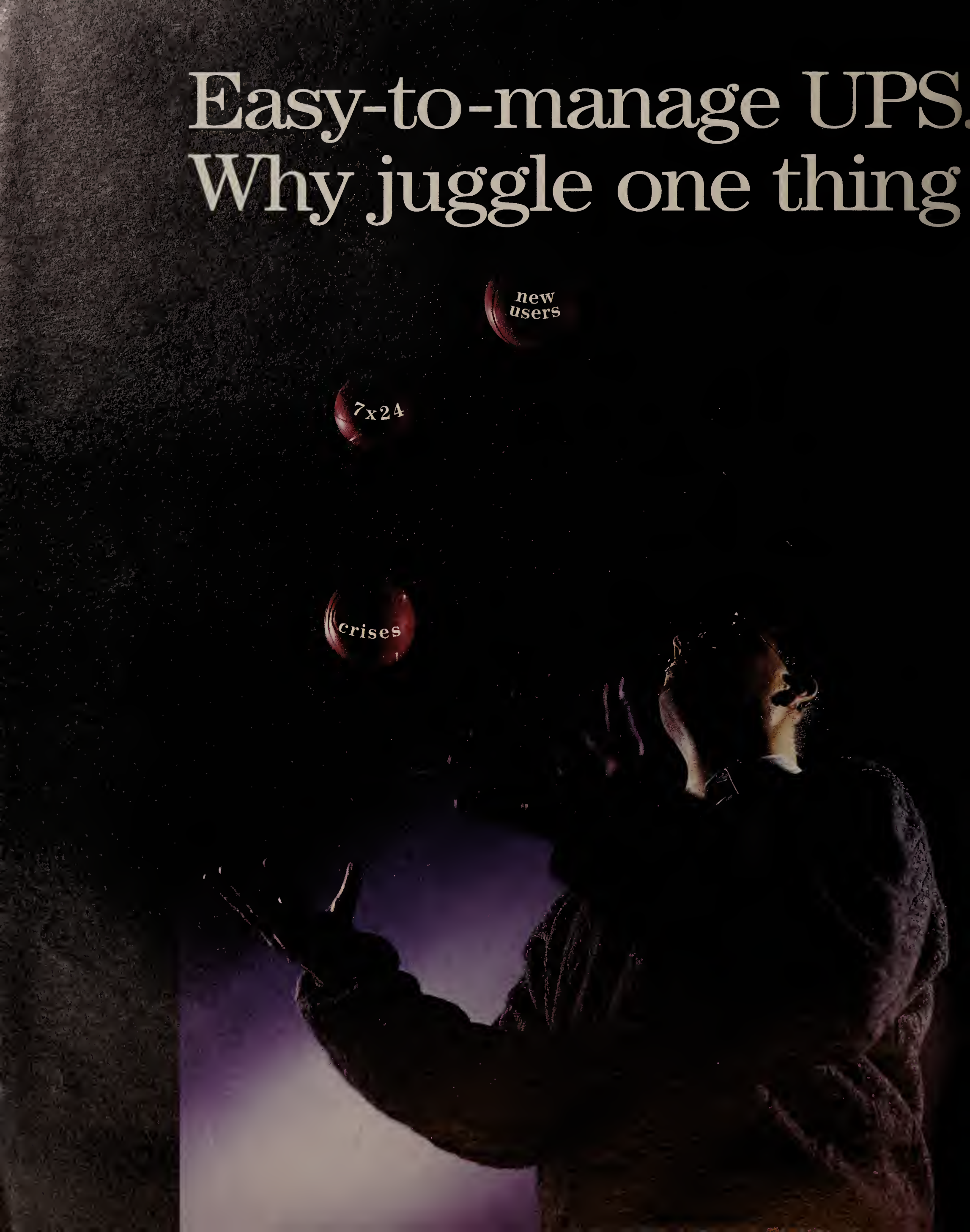
Ipsilon's IP Switch ATM 1600 is intended to break through the physical logjam of switched internets that couple routers and switches. It also sidesteps the political impasse that has stifled

See **Ipsilon,** *page 68*

NEWSPAPER $5.00

Access Network World Fusion using the number in yellow. See page 5 for details.

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$519
HP PowerWise 1000
(Incl. Software†, OpenView Utility, cable)

$649
HP PowerWise L1250
(Incl. Software†, SNMP agent, OpenView Utility, cable)

$1179
HP PowerWise 2100
(Incl. Software†, OpenView Utility, cable)

HP PowerWise UPS. Power management and power pricing finally meet.

In a perfect world, you'd have the time and resources to scrutinize network power personally, from start to finish. But in the real world, it's just one of many pressing concerns. That's why you need the perfect UPS. From ordering to operation, the HP PowerWise manages every last detail of network power. Leaving you free to keep your eye on the big picture.

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And once PowerWise is on line, it provides reliable, unattended shutdown of server and network operations. It monitors and predicts battery failure in advance. It even gives you remote central management through a single OpenView console and remote paging capability. Plus, it includes inventory reporting capabilities that display all the vital statistics of UPSs on your network. All of which leaves you more time to deal with the rest of your demanding job.

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* List prices as of October 1, 1995. † PowerWise Assistant; shutdown, management and diagnostics software for Windows NT and Novell Netware (other OSs available separately). © 1996 Hewlett-Packard Company. All rights reserved.



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NetworkWorld Fusion

http://www.nwfusion.com

This Week

News+

The Front Page:

- **IP over ATM:** Download papers describing classical IP over ATM and Multiprotocol over ATM — two competitors to start-up Ipsilon Networks' alternative.
- **888:** See just how bad the shortage of 800 numbers was by downloading the FCC order establishing the new 888 toll-free area code.
- **Notes:** See what AT&T and Lotus originally promised when Network Notes was unveiled in 1994.

The Technical Sections:

- **Web databases:** A variety of companies now offer tools to link Web browsers to back-end relational databases. See what they're selling, in Client/Server Applications.
- **TCP/IP:** Large TCP/IP networks mean potential management headaches. Read up on efforts to make administration easier via BOOTP and Dynamic Host Configuration Protocol, in WANs & Internetworking.
- **100VG-AnyLAN:** Download a guide to negotiating the fast Ethernet maze, and read up on why Hewlett-Packard decided to offer a 100Base-T product line, in Local Networks.
- **The Internet:** Get information on ISP pricing policies, in Electronic Commerce.

Forum

- **Our Java joust continues:** Join in the debate about Java and whether it's the wave of the future or an overhyped language.

this week's pick

Stroud's Consumate WinSock Applications List is perhaps the best place on the Internet to find freeware/shareware TCP/IP applications for Windows and Windows 95 clients. And it has a new URL: http://www.enterprise.net/cwsapps/.

HOW TO GET ON TO NETWORK WORLD FUSION

At the welcome screen, click on First Visit and follow the instructions. Subscribers, keep your NWF number — highlighted on the front cover's mailing label — handy during registration. Non-subscribers must fill out an on-line registration form.

NetworkWorld Fusion

CONFERENCE PICK

HOT TOPIC

Career counselor Richard Van Doren this week goes on-line in a Network World Fusion conference to field questions about your professional life.

Select Forum then Networking Careers.

NetworkWorld
An IDG Publication

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NetworkWorld's *Mission: To provide news and analysis that help network IS professionals deliver the network computing infrastructure and distributed applications required to meet evolving business needs.*

News briefs, March 4, 1996

No escaping Netscape

Netscape Communications Corp. will announce at its developers conference this week Version 2.0 of its Web server, which will support the Secure Electronic Transactions specification from Visa International, Inc. and MasterCard International, Inc. Netscape also will unveil a Windows NT Internet server with integrated electronic mail and Usenet proxies, a Web-based electronic catalog and an application development tool called LiveWire Pro.

3Com branches out

Branch office users have long been networking's second-class citizens, but 3Com Corp. hopes to put them on top with its new OfficeConnect suite of highly manageable network gear. The OfficeConnect line announced last week includes hubs, bridge/routers and print and fax servers that offer many of the same connectivity and management features found in 3Com's enterprise-level equipment, said 3Com Chief Executive Officer Eric Benhamou.



JOHN THOMPSON

Benhamou

Mesa upgrades groupware

The Mesa Group, based in Newton, Mass., today will ship Conference+ 2.0, an upgrade to its groupware product for users of Microsoft Mail. New features include Microsoft's Messaging Application Programming Interface 1.0 object store, simplified replication, custom forms, custom-defined views and more subfolder levels. Release 2 costs $30 to $75 per user. An Internet-enabled edition of the product is also in the works.

The Xylan plan

Xylan Corp. this week will roll out new FDDI and Copper Distributed Data Interface (CDDI) switch modules for its OmniSwitch chassis. The new modules can support as many as 16 FDDI or 48 CDDI switched connections. Pricing starts at $7,950; both will be available this month.

Here comes the Solstice

SunSoft, Inc. has moved up availability of its Solstice Enterprise Manager platform to this summer. Version 2.0 of the software had been expected late this year (*NW*, Nov. 6, 1995, page 17). Meanwhile, Version 3.0 will ship next winter, the company said.

Separately, SunSoft this week will introduce PC Software Director, a product for managing PC clients on Solaris networks. It can be used to take inventory on client hardware and software, distribute applications and monitor application usage.

Stretching out ISDN

Adtran, Inc. last week introduced equipment that gives carriers one less reason for skimpy ISDN deployments. The company's Total Reach line cards and network interface unit will let carriers deliver ISDN service 30,500 feet from the central office. Previously, ISDN lines could reach only 18,000 feet without expensive repeaters. Several Bell companies will test the products.

Analyzing your Web

InContext Corp. last week announced software intended to ease management of Web sites. Called WebAnalyzer, the software provides a graphical view of any Web site and pinpoints problems such as broken or missing links. WebAnalyzer costs $149 and is in beta release.

Keeping track

Internet Profiles Corp. (I/PRO) has organized a Universal Registration System for the Web intended to give corporations with Web sites a way to determine the personal and business demographics of their Web site visitors. Web users voluntarily register information about themselves, after which they are given a code they can use when visiting Web sites that support the I/PRO registration system. I/PRO said it has already registered 100,000 people, some lured by the possibility of winning a sweepstakes.

Money for nothing, NCP for free

By Michael Cooney
Raleigh, N.C.

IBM this week will make a strategic shift in the pricing for front-end processor (FEP) software that will save SNA users tens of thousands of dollars.

The firm will unveil Network Control Program (NCP) Version 7.4 and a license that waives the monthly maintenance fee for users that install Advanced Peer-to-Peer Networking on the 3746 Model 900 FEP. The 3746-900 is an expansion unit that bolts onto existing 3745 FEPs.

3746 software pricing by the numbers

Under a new IBM licensing plan, 3745/3746 Model 900 users can cut back on Network Control Program costs for their front-end processors and eliminate software charges on the 3746 Model 900 by installing an APPN package.

Tier A (four adapters or fewer)
$450 per month x 12 months = $5,400 per year

Tier B (five adapters or more, up to 10)
$900 per month x 12 months = $10,800 per year

Tier C
No charge with APPN Network Node package installed

Besides making it less expensive for users to operate SNA nets and migrate to APPN, NCP 7.4 adds a number of capabilities, including the ability to support nearly twice as many users and larger frame relay-based nets.

"We've been getting beaten up by the competition and big users about the cost of NCP, so we are eliminating that as an issue with 7.4," said Shelly Howrigon, an IBM NCP software specialist. "Typical users can expect to see a $900 to $2,500 per-month savings in ongoing license fees," Howrigon added.

Of course, there are no free lunches. In order to take advantage of the NCP 7.4 license feature, users have to install the 5022 Network Node processor on the 3746-900, which runs about $12,000.

The NCP 7.4 license feature, known as Tier C, will let users of NCP Version 7 and higher as well as those that have 3746-900s put as many as 10 LAN or WAN interface boards inside the expansion unit. Today, users are charged for the number of adapters in the 3746-900 (see graphic).

"While the idea is to let users more inexpensively migrate to APPN, they can also now move as much function as possible to the 3746-900 and minimize NCP charges even further on existing 3745s," Howrigon said.

"NCP software pricing has been a big bugaboo for IBM, and what they are talking about doing with NCP [7.4] should help proliferate the Model 900," said Ron Sanderson, manager of net software and support for the Illinois Department of Central Management Services in Springfield.

James Harrington, director of wide-area networking for the Social Security Administration in Baltimore said the potential NCP software savings are enormous.

"We are bringing along about 55,000 devices into our SNA net in the next year or so, and the promised reduction in NCP charges is the main reason we're moving to the 3746-900," he said. Also good news to him is the increased capacity of the 3746-900.

"Where a 3746-900 could support 1,500 stations, it can now support 5,000, and where, in an APPN configuration, we could support communications with four hosts, we now go to 16," Howrigon said.

Users also like the new frame relay support in NCP 7.4. The new Internal Frame Switching support lets devices connected to frame relay links on the 3745 communicate with devices linked to frame relay links on the 3746-900. Until now, devices linked to the 3745 and the 3746-900 via frame relay could not communicate through the box.

"The new frame relay is very important because it preserves our investment in the 3745, which is a critical issue for us, plus it lets us expand the service area of our frame relay net," Sanderson said.

NCP 7.4 will be available March 29 for MVS and VM systems. A VSE version is expected in June.

✆IBM: (800) 426-2255.

No-show Cisco

While IBM was making the 3745 more Advanced Peer-to-Peer Networking friendly, 3Com Corp., Bay Networks, Inc. and other vendors were busy last week testing the interoperability of their APPN/High Performance Routing (HPR) implementations.

The "connectathon" generally went off without a hitch, but Cisco Systems, Inc. created a stir by not showing up.

Cisco is expected to have its own HPR announcement in a couple of weeks (*NW*, Jan. 29, page 1), and some observers speculated Cisco didn't want to show its hand just yet. Others were highly critical of the no-show, saying Cisco has a lot to prove in the APPN arena and it should be attending these events to demonstrate its commitment.

As for the connectathon, the vendors focused on testing mixed HPR and traditional SNA traffic to see how well the two would work together, said Wendy Arnette, HPR program manager at IBM.

"The vendors demonstrated that they could indeed reroute around failed devices, and dependent LU Requestor [traditional 3270 traffic] can run effectively in the multivendor HPR environment," she said.

—Michael Cooney

HOW TO REACH US

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Brainshare '96 preview

Novell to focus on making NetWare development easier

By Kevin Fogarty

Scottsdale, Ariz.

Novell, Inc. later this month will announce that it has licensed from a small Arizona firm technology designed to make it as easy to write applications for NetWare as for Windows.

Novell has licensed a scripting tool and API technology from HiTecSoft Corp. that will enable developers to build NetWare Loadable Modules (NLM) by tying together components via scripts written with standard tools.

Also, the NLMs will have automatic access to NetWare Directory Services (NDS) and other NetWare services.

Previously, developers had to write NLMs in C and address a host of arcane APIs to access NetWare services.

Novell officials confirmed that it will build HiTecSoft's Network Management Extensions (NMX) into the next version of NetWare — called Green River — and into its Net2000 software developers' kit.

The NMX technology is one piece of a three-part application development strategy that Novell plans to unveil at its Brainshare '96 conference March 18-22 in Salt Lake City.

Novell also will air plans to extend NDS, enabling it to track and manage application components.

In addition, the company plans to deliver new links between NetWare, GroupWise and other Novell applications so developers can more easily build applications that can work with multiple Novell products.

The NMX technology makes building NLMs easier but does not make NetWare itself any more attractive as an applications server, said Neal MacDonald, an analyst at Gartner Group, Inc.

NLM interoperability

NMX is a breakthrough for NetWare developers because it lets them access NetWare services using simple commands, according to Sean Moshir, HiTecSoft president and chief executive officer.

It also provides limited memory protection for NLMs to keep them from abending a server and makes it easy to build applications with tight ties to the Internet, Moshir said.

Those capabilities would make NLM development easy enough that net managers could write customized corporate applications — including utilities to manage NetWare — that run on NetWare servers, he said.

NMX is both a development tool and an NLM management utility that loads NMX applications as they are needed, then unloads them to save memory when they are no longer needed, according to one Novell official. "Full scripting on NetWare — this is some hot stuff," the official said.

Any application written using the NMX APIs can call on the functions of any other NMX application, Moshir said. That means corporate developers could take NMX components that address the NetWare 4.1 compression service and access Oracle Corp.'s database, for example, and link them with a Visual Basic script.

"You could write a script that, before writing anything to the database, compresses everything," he said.

"Today, NLMs are black boxes — they have no idea how to talk to each other and they don't interact," Moshir said. "NMX allows them to expose their methods and functions as objects to the outside world."

The interoperability feature of the NMX technology is analogous to the Dynamic Link Libraries in Windows, he said.

Novell also has licensed and will distribute NetBasic, a scripting tool that automatically creates and links NMX applications, Novell officials said.

Thanks to tight World-Wide Web hooks, NMXs could prove particularly useful for building NLMs that work in conjunction with Web servers, said Thad Phettaplace, president of Great Lakes Commercial Internet, Inc. in Milwaukee, which sells a NetWare-based Web server.

NMX supports both the Common Gateway Interface (CGI) and HyperText Transfer Protocol, making it possible for users to view NMX application interface screens employing a Web browser, Moshir said.

"Performance-wise, it is the best technology we've seen for doing CGI-type development," Phettaplace said. ■

Making NetWare access easy

Novell is adding technology from HiTecSoft to the Net2000 application development tool kit, enabling companies to build applications that give end users easy access to:

These NetWare services . . .

- NetWare Directory Services
- Web Page HTTP Authentication and Extension Services
- Protocol Services (IPX, SPX and TCP/IP)
- Message Handling Services
- SNMP Alert Services

. . . and these third-party applications, among others

- Sybase and Informix databases
- American Internet and GLACI Web servers
- Cheyenne and Arcada backup software
- American Power Conversion uninterruptible power supply controllers

A B E N D

abend *(n)* **1:** abnormal end to a computer process **2:** the on-line fountain of 'Net wit and high-tech humor found on Network World Fusion (www.nwfusion.com).

Arming yourself for the Flame Wars

The following tips can help ensure that when the time comes, you will effortlessly render your adversary torched and toasted:

- Make things up about your opponent. It's important to make your lies sound true.
- Doubt your opponent's existence. You've never actually seen your opponent, have you?

More tips on flaming technique can be found at http://www.students.uiuc.edu/~roth/comp-humor/net/flame-rules

Network World Fusion

HP finally ready to roll out edition of OpenView

By Jim Duffy

Hewlett-Packard Co. and Cabletron Systems, Inc. this week will look to raise the appeal of their network management offerings by embracing fashionable products from other vendors.

At long last, HP will unveil OpenView Network Node Manager for Windows NT, a version of HP's market-leading network management platform for Microsoft Corp.'s increasingly popular operating system. HP will also roll out agent software for NT and NetWare servers, and a network operating system (NOS) management application suite for its low-end OpenView for Windows platform.

It's about time

HP announced its intention to put OpenView on NT in November 1993 but has been dragging its feet since then for fear of cannibalizing its Unix-based HP-UX server business, according to HP insiders (*NW*, Nov. 15, 1993, page 1).

But after a changing of the guard in HP's Computer Systems Organization, the company is finally ready to deliver on its promise.

OpenView Network Node Manager on NT brings all of the node discovery, mapping and event-handling capabilities of its HP-UX brethren to the Microsoft operating system. It was jointly developed by HP's Unix and Windows OpenView teams, and it will interoperate with the upcoming distributed Tornado release of OpenView due mid-year.

But there is speculation that the NT and HP-UX OpenView APIs are different. That means application developers would have to either choose between the platforms or write to both. If they choose one platform, users of the other could be missing out on some applications.

There are also interoperability issues, according to users. "The issue it raises is about the third-party products and whether or not they would then be compatible," said Rick Sturm, a member of the technical staff at US WEST Communications, Inc. in Boulder, Colo.

The NT product is expected to ship this fall. Pricing information was not available at press time.

HP is also expected to announce MeasureWare, OperationsCenter and AdminCenter agents for Windows NT and NetWare clients and servers. MeasureWare tracks response time and reports it to OpenView's PerfView performance monitoring application. OperationsCenter monitors system uptime, while AdminCenter provides change and configuration management.

The MeasureWare agents are expected to ship in the second half of this year. A shipping date on the OperationsCenter and AdminCenter agents, as well as pricing for all agent software, was not available at press time.

Lastly, HP is expected to unwrap an application suite for its OpenView for Windows platform that bundles Symantec Corp.'s Norton Administrator tool with NOS management capabilities for NT and NetWare servers. Called Workgroup Node Manager Professional Suite, the application performs print-job management, creation and deletion of file-sharing directories, and user account management, sources said.

Management system makeovers

From HP:

- OpenView Network Node Manager for Windows NT
- OpenView for Windows Workgroup Node Manager Professional Suite
- MeasureWare agents for NT and NetWare clients and servers

From Cabletron:

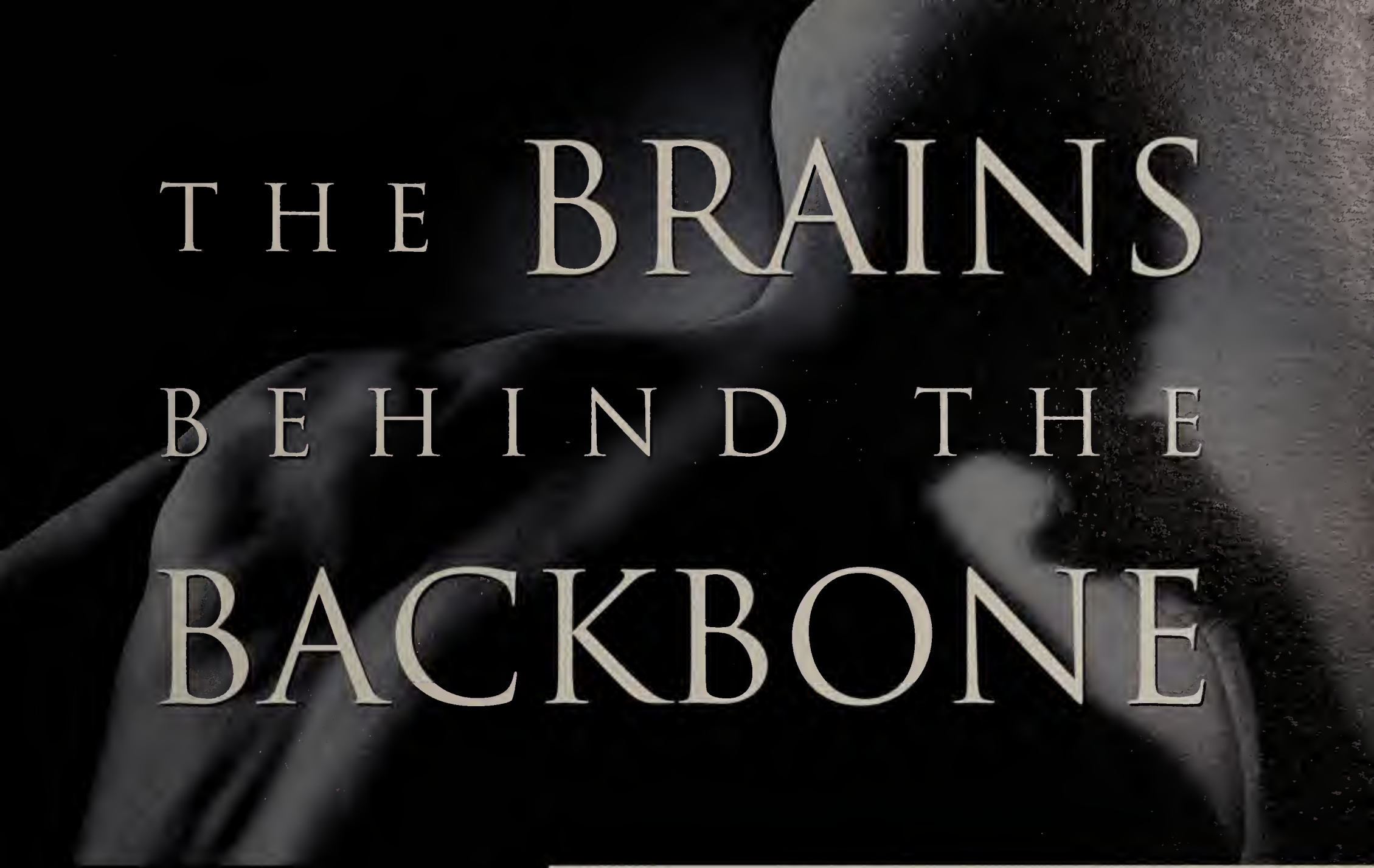
- Integration of Spectrum with Seagate's NerveCenter

Information about pricing and availability was not revealed at press time. HP declined to comment.

Growing Spectrum

Cabletron, meanwhile, will announce that its Spectrum management system customers can now use Seagate Enterprise Management Software, Inc.'s trendy NerveCenter event correlation engine.

When Cabletron's Spectrum 4.0 ships later this quarter, it will include an API that allows users to integrate Seagate's NerveCenter Pro event correlator with it. Though Spectrum already features sophisticated event correlation, NerveCenter will bring cross-domain correlation across Unix, NT and NetWare servers, and more customizable event handling. ■



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US WEST consumes Continental Cable

By Tim Greene

In the high-stakes game dealt by the new telecommunications law, US WEST, Inc. has laid its hand on the table, wagering billions of dollars that cable TV networks can beat traditional phone networks in delivering voice, video, data and Internet access services.

The regional Bell operating company last week bought up Continental Cablevision Corp. for $10.8 billion and laid out plans to offer all those services to 4.7 million cable TV subscribers in 20 states over the next four years.



To do so, Continental has to add switches, fiber and other upgrades to its cable network to support two-way transmissions and telephony. And all that will cost even more money — $250 to $450 per home, according to Chuck Lillis, president and chief executive officer of US WEST's media group, an arm of US WEST that already has a partnership with another cable giant, Time Warner, Inc.

US WEST chose the cable route to new business opportunities because company executives believe hybrid fiber/coaxial (HFC) cable networks offer the highest capacity and the best ability to support a variety of services. "Only HFC runs the whole package," Lillis said.

But the strategy has put US WEST at odds with other RBOCs, which are more interested in offering long-distance services within their regions. Getting permission to do so is likely to take at least a year, but they plan to do that before expanding into out-of-region local services.

And when they do expand, the prevailing model will be reselling services from existing local providers, including other RBOCs and competitive access providers (CAP). They do not plan on building networks as US WEST does.

RBOCs could buy CAPs to gain local networks, but even CAPs don't have the penetration to customer homes that cable TV networks do. They would still have to buy that access from the local exchange carrier.

WHAT US WEST IS BUYING

Headquarters: Boston

Purchase price: $5.3 billion in cash and stock, and $5.5 billion in assumed debt

Assets: Cable TV networks in 20 states that will be totally upgraded for telephony traffic by the end of 1999

4.2 million subscribers

20% ownership of competitive access provider Teleport Communications Group

1995 revenue: $1.4 billion

While more conservative because the capital investment is lower, this approach leaves the RBOC dependent on other providers for the quality of service they offer, according to Robert Rosenberg, president of Insight Research, a Livingston, N.J., telecommunications market research firm.

US WEST's approach gives it net control in six key markets: Boston, Chicago, Los Angeles, Detroit, Atlanta and Florida. Continental also brings a dozen other clustered networks of more than 250,000 customers.

In addition, US WEST's partnership with Time Warner gives it access to an additional 1.5 million customers over fiber/coaxial networks and an imposing block of 16.2 million customers representing about 30% of cable TV users in 60 of the top 100 markets in the U.S.

The downside is that fiber/coaxial networks that deliver the range of services US WEST promises have never been widely deployed, and even Lillis acknowledged the technology is still in the "shakedown" phase. But he expressed confidence that it would be ready to offer services by next year.

Amos Hostetter, Continental CEO, said high-speed Internet and remote access services will be a significant source of revenue for US WEST next year. "There will be tens, if not hundreds of thousands of cable modems in place by later this year," he said.

Meanwhile, US WEST has already begun expanding its data services beyond its 14-state footprint via Enterprise, a division of its communications unit. The company is offering Internet access, frame relay and transparent LAN services in seven states. In Jacksonville, Fla., the services are offered over a fiber/coaxial net 80% owned by Continental.

It also has general plans to team with CAPs to expand its services.

Geri Wait, vice president and general manager of national expansion for Enterprise, said that when the Continental network is ready, Enterprise will use it as a platform for data services.

That fits with the general strategy announced earlier this year by US WEST CEO Richard McCormick to compete in selected markets — the same cream-skimming technique CAPs have been using against RBOCs.

To consolidate markets, US WEST wants to arrange swaps of networks — as much as 20% of its holdings — with other cable TV providers. ■

IBM's CICS gaining client/server hooks

IBM next month to introduce tools that let C++ developers have their CICS.

By John Cox

IBM next month will take its first big step in blending object-oriented technology with its CICS transaction processing monitor, a move designed to help customers build more powerful client/server applications.

Corporate MIS groups are embracing object-oriented development tools to build software components that can be reused or easily changed in new applications. But so far, object-oriented applications have been limited to the desktop and have been unable to work easily, if at all, with back-end transaction systems.

What is needed, IBM officials said, is support for data and transaction integrity and high traffic volumes. In addition, client/server applications increasingly need access to multiple databases, transaction servers and other distributed services such as queued messaging, directory and security.

IBM announcements addressing these issues will include:

■ Client-side C++ class libraries, which make the existing CICS client APIs appear as objects that can be called by the client application. Then, via the standard CICS communications features, the application connects with the appropriate CICS server. Initially, these libraries will be for OS/2.

■ A beta version of a server-based C++ class library that encapsulates most of the CICS server APIs. The library gives developers a set of objects that can be invoked seamlessly from C++ applications. These objects would have to be built by hand today. Working with the new library, developers still need to know which CICS servers they want to reach. In a fully distributed object environment, the object request broker (ORB) would handle such issues. The ultimate goal is to let developers represent CICS transactions as objects, which can then be shared among applications, according to Geoff Sharman, market strategy consultant for IBM Transaction Systems in Hampshire, England.

■ A prototype Transaction Client for the Java language. Java applets downloaded over a network to a client-based Web browser will talk to the Java-based Transaction Client, which will then act as the interface to CICS.

■ General release of Internet Client, which was released last year in beta form. The University of Florida in Gainesville has been working with it to give students and other users direct access to selected CICS-based systems.

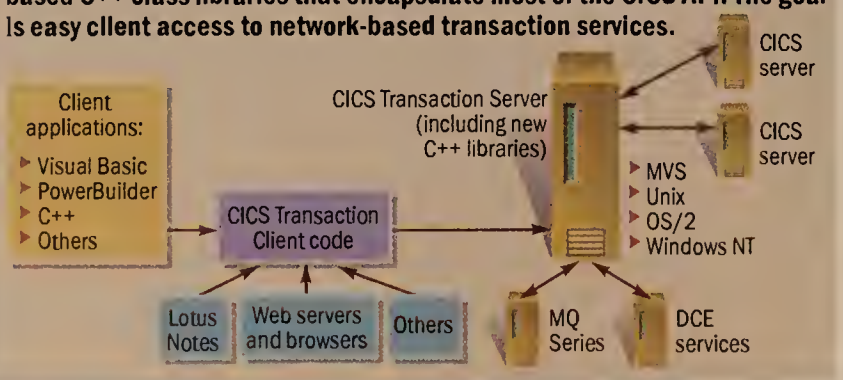
"More and more people want to access applications from a Web browser," said Steve Ware, systems coordinator with the IBM CICS Systems Group. "We're giving them that access." The Internet Client imposes some restrictions, but many applications have run with almost no changes, he said.

Over the long term, IBM is pursuing several options to integrate its System Object Model (SOM) ORB technology with CICS, and to create a bridge between Microsoft Corp. OLE objects and SOM objects, according to Sharman.

"IBM's strategy maps well with where [corporate] IS is now — that is, using object-oriented [client] applications and trying to link these with mission-critical systems," said Karen Boucher, market analyst with Standish Group International, Inc., a Dennis, Mass.-based consulting firm that specializes in on-line transaction processing.

IBM's evolving transaction system

Next month, IBM will unveil new CICS clients as well as client- and server-based C++ class libraries that encapsulate most of the CICS API. The goal is easy client access to network-based transaction services.



You'll get a kick out of the extra CICS info available on Network World Fusion, including:

- An article on how IBM is opening up CICS to TCP/IP
- A look at Big Blue's object-oriented CICS management scheme
- Information on CICS mailing lists

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http://www.nwfusion.com

A recent Standish survey found that 58% of corporate information systems respondents were developing or planned to develop object-oriented applications in the next 12 months. Of these, 37% said they would use object development tools; 26% would use an object database; and 16% would use an ORB. Twenty percent of respondents said transaction integrity was very important in these applications. Thirteen percent said OLE interoperability was also important. ■

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switching. When we eat dinner, we
about our future, we talk about swi
we go on and on about switching. When



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Network management

Bay bolsters RMON plan with $33 million purchase

By Jim Duffy
Santa Clara, Calif.

Bay Networks, Inc. last week announced plans to acquire Armon Networking, Ltd., a maker of Remote Monitoring (RMON) probes, analyzers and applications, for $33 million.

Armon's technology will augment Bay's current RMON offerings — comprising agent and analysis software, as well as embedded probes — by providing stand-alone probes and more sophisticated applications for network accounting and billing.

The Armon acquisition bolsters Bay's recently announced strategy to add RMON and RMON2 capabilities across its product line (*NW*, Sept. 25, 1995, page 1). The technology is important for providing statistics on network traffic that can be used to charge back users for network services.

As part of the acquisition announcement, Bay and Armon said they have codeveloped a stackable RMON probe for multisegment LANs. Called StackProbe, the device can be stacked with switches, hubs and routers to provide continuous monitoring of switch-to-server and switch-to-switch links.

"Having a stackable probe will allow us to provide our users with a completely managed switched environment," said Gary Bowen, Bay's executive vice president for worldwide field operations and marketing.

Bay and Armon also have a year-old partnership in place to enhance Bay's Optivity management application with RMON technology.

By purchasing Armon, Bay is underscoring just how important RMON technology is to it.

"It puts a little heat on Cisco, 3Com and Cabletron to come up with a similar RMON strategy," said Brian Burba, an analyst at International Data Corp. in Framingham, Mass.

Cisco Systems, Inc. is working closely with Frontier Software Development, Inc. in the RMON area, while 3Com Corp. is aligned with Axon Networks, Inc. Cabletron Systems, Inc. has embedded RMON probes on its Ethernet switches but is not allied with any particular RMON vendor.

Bay's acquisition of Armon is expected to be completed this quarter, at which time Armon will be integrated into Bay's network management group under the name Bay Networks Israel, Ltd. Yigal Jacoby, Armon president and chief executive officer, will become a Bay vice president. ■

Headquarters:	Tel Aviv, Israel
Primary business:	Makes RMON probes, analyzers and applications
1995 revenue:	$4.7 million (Estimate from IDC in Framingham, Mass.)
1995 market share:	4.7% of $385 million market (IDC estimate)
Top management:	Yigal Jacoby, president and chief executive officer

AT&T muscle could boost 'Net numbers

Carrier enters dial up Internet market with big incentives to attract the masses.

By Joanie Wexler
New York

The lion has roared.

AT&T last week joined the dial-up 'Net access fray. Its service is free for the first year as long as users don't spend more than five hours a month on-line. AT&T will also offer unlimited access for $19.95 per month.

Despite its hype, AT&T is actually playing a little catch-up. AT&T nemesis MCI Communications Corp., America Online, Inc. and NetCom, Inc. are among the companies that have long offered Internet dial access at similar prices.

The move has several potential effects, including:

- Dramatically increasing the number of 'Net users.
- Stirring an Internet service provider (ISP) shakeout.
- Raising questions about a smaller AT&T's ability to support customers.

The company announced that on March 14 it will start offering an Internet service package that includes the AT&T-branded Netscape Communications Corp. Navigator browser software, homegrown navigational and directory services, filtering software for concerned parents, 24-hour hot line support and five hours of free dial-up Internet access per month for one year. The free access offer applies to any AT&T residential service customer who signs on this year.

Users who stay connected longer than five hours pay $2.50 per hour. Heavier users may opt for the flat fee for unlimited usage.

The market impact could be huge. AT&T has the muscle to stir up segments of the population that haven't been introduced to the 'Net, which should create sales opportunities for companies doing business on the World-Wide Web, said Danny Briere, president of TeleChoice, Inc., a telecommunications consulting firm based in Verona, N.J.

For instance, studies indicate that the average Internet user today is an under-40 male college graduate. But if AT&T helps its 80 million customers get over their technophobia by letting them browse the Web without having to watch the clock, "Geritol might start making on-line sales to older women," Briere said.

Even with its girth, AT&T could face big challenges. "There's a lot about the Internet they have no control over," said Allen Weiner, director and principal analyst for on-line strategies at Dataquest, Inc., a research firm in San Jose, Calif. For example, the multiple-operator nature of the 'Net will make it difficult for AT&T to make network guarantees, as it is accustomed to doing.

AT&T is laying off huge numbers of workers, raising the question of whether it is ready to support millions of new Internet users.

Who's manning the fort?

But the poor track record of its ISP competitors may work to AT&T's advantage. Since customer service is a weakness of many ISPs, AT&T's customer service could appear outstanding in comparison. It has an inbound call center infrastructure in place and a long-standing blueprint for customer service, Weiner said.

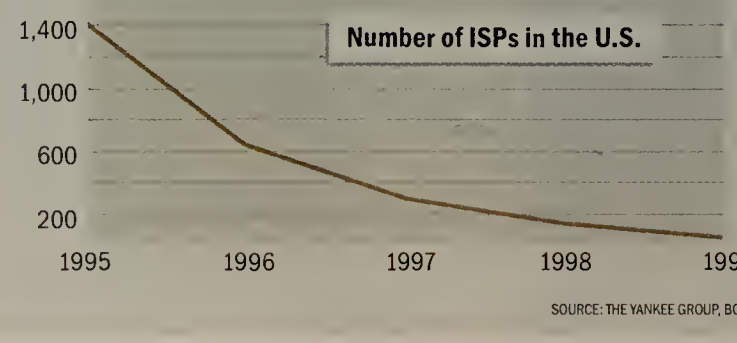
How many will be left?

Dramatic consolidation in the ISP industry has already been forecast by many sources (see graphic), and AT&T's entry into the dial access market could accelerate the shakeout.

With AT&T setting the price standard from which competitors have traditionally discounted, "other ISPs who are more expensive won't survive. Dropping prices will affect the margins ISP competitors will be able to operate on," Weiner noted. ■

ISP shakeout ahead?

AT&T's integrated 'Net and telephony services could accelerate a massive shakeout among Internet service providers.



SOURCE: THE YANKEE GROUP, BOSTON

Infonet launches suite of public net-based apps

By Joanie Wexler
El Segundo, Calif.

Last week, AT&T abandoned its public Lotus Notes network service. This week, global network service provider Infonet Services Corp. is picking up the baton with a bold application-hosting initiative that includes Notes.

The company today plans to announce the Global WorkPlace, a suite of integrated collaboration, messaging, electronic commerce, intranet, multimedia, directory and LAN management services, all accessible through its worldwide transport network.

The suite combines the old and new. Infonet has taken some existing services, such as messaging and electronic data interchange, added some of its own and some third-party services, and integrated them so they can be managed collectively by Infonet, said Alex Rassey, general manager of Infonet's Global Workplace Services.

Despite AT&T's stunning withdrawal from the Notes hosting market, there are still benefits to this sort of outsourcing. Having a third party worry about server maintenance, modem pools, software updates and the like is driving some users to look at network-hosted applications, Infonet executives said.

Infonet said that within three months, its net will host Netscape Communications Corp.'s Collabra Share groupware, which allows threaded text conferencing.

Within six months, Infonet will run Lotus Notes workgroup servers and Novell, Inc. GroupWise mail systems on its network and plans to offer directory services based on technology from an unnamed third party. At that time, the company plans to offer integrated voice, data and fax over its frame relay network. Voice over frame can be particularly economical for sites in other countries, where voice rates are still high, noted Steven Taylor, president of Distributed Networking Associates, a consultancy in Greensboro, N.C.

Available immediately will be a LAN management service, which offers three levels of management: Simple Network Management Protocol devices, file servers and desktops.

"Infonet can talk to all pieces of the puzzle," said Kevin Rota, manager of office automation at Cushman & Wakefield, a real estate services company headquartered in New York.

Since Infonet constructed Cushman & Wakefield's Internet electronic mail gateway and Web server, the carrier was able to work it so that mail arriving on the Cushman Web server is routed directly to its internal mail system.

Users can pick and choose what components they want, and all are billed at a monthly flat rate. ■

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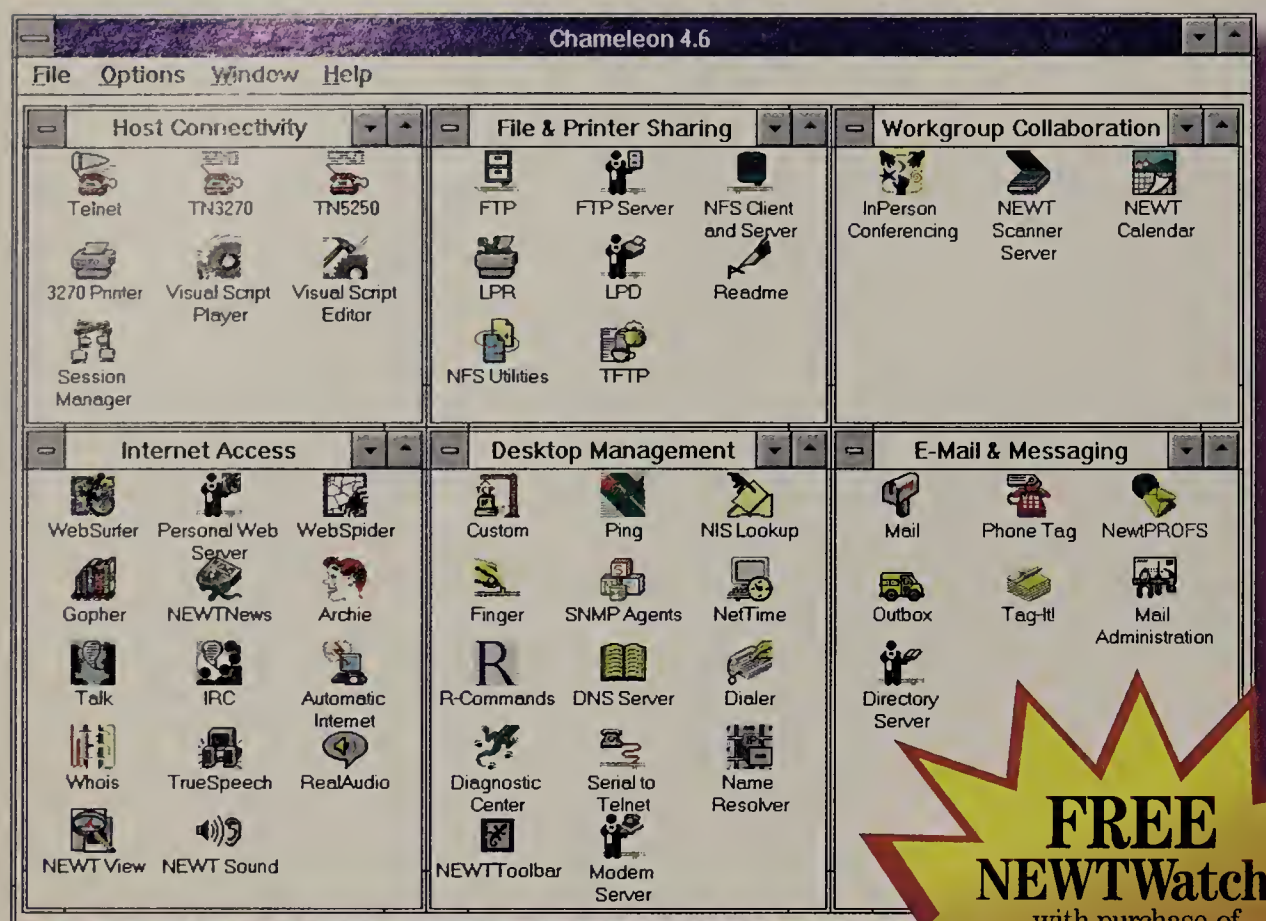
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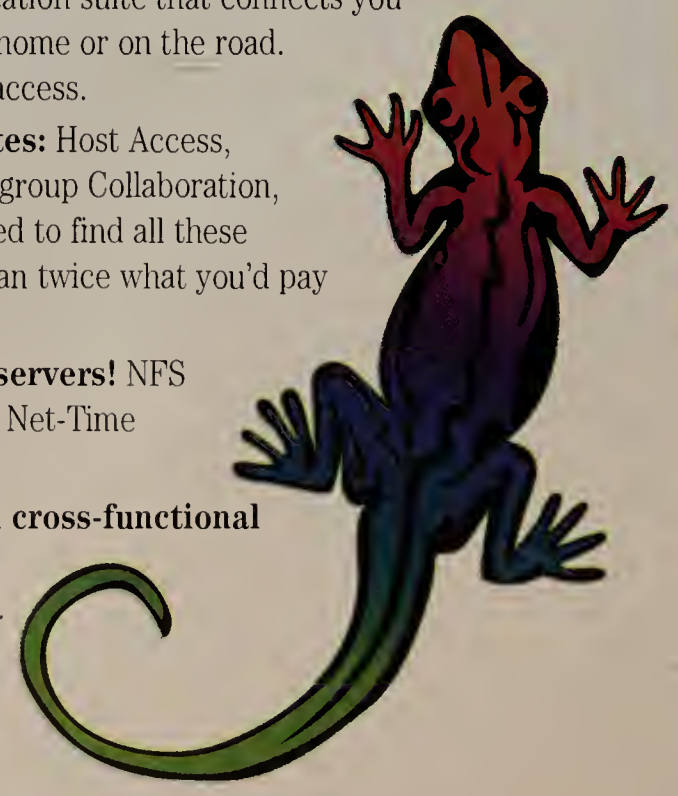
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Briefs

■ **Shiva Corp.** *has announced a product packaging strategy to address* **Internet and intranet access requirements.**

The firm unveiled WebRover, an offering that bundles Shiva's LANRover remote access server, the ShivaIntegrator 200 router and firewall software from Raptor Systems, Inc. WebRover is intended to provide secure access to the Internet for LAN users and the LAN for remote users, and to dedicated intranet Web servers.

WebRover costs $5,999 and will be available this month.

Shiva: (617) 270-8300.

■ *SNA users looking to migrate* **legacy equipment to a TCP/IP backbone** *can look at a new product from* **Systems and Synchronous, Inc. (SSI).**

The company last week announced LANPanther, a hardware/software package that converts SNA 3270 or bisynchronous traffic into tn3270 datastreams for access to TCP/IP resources.

SSI: (708) 505-5701.

■ **BGS Systems, Inc.** *has allied with Digital Equipment Corp. and NCR Corp. to bring* **performance management** *capabilities to Unix systems.*

Under the Digital alliance, BGS and Digital have agreed to develop joint marketing programs to promote the use of BGS' Best/1 performance and capacity management software on Digital Unix workstations and servers.

Under the NCR pact, the companies will do the same for NCR's Unix-based hardware. Both companies' worldwide sales forces will collaborate on sales, and NCR will provide technical support for Best/1 on NCR systems.

■ *Senate Commerce Committee Chairman Larry Pressler (R-S.D.) lashed out at the Federal Communications Commission for recent suggestions that its budget is inadequate to* **implement the Telecommunications Act of 1996.** *In a letter to the five FCC commissioners, Pressler said he found budget complaints by* **FCC Chairman Reed Hundt** *and others "troubling" given the "explosive growth" of the FCC budget since 1992.*

CallBridge uses data to route 800 calls

By David Rohde
Santa Clara, Calif.

PBX maker Siemens Rolm Communications, Inc. this week will announce an enhanced computer-telephony link that allows corporate data to play a larger role in call centers' call routing function.

Version 3.0 of CallBridge offers links between its private branch exchange systems' automatic call distribution (ACD) capabilities and host computers or LAN servers supporting call center agents' workstations.

The new version of the 6-year-old CallBridge enables rapidly changing data that could affect call center activity — anything from company sales trends to

See **Siemens Rolm,** *page 25*

Sprint, Westinghouse boost remote access

By Joanie Wexler

A Big Three carrier and a little-known player are the latest contributors to the thriving remote access services market.

Sprint Corp. threw its hat in the ring last week with Intranet Dial Service. The IP-based service lets users dial up modem pools in the Sprint network, get authenticated and then get routed to their host-site LANs or World-Wide Web servers.

Sprint will have local 28.8K bit/sec dial access in 50 cities this month, which should spread to 200 cities by June, said Brad Hokamp, Sprint's director of advanced data services.

Meanwhile, Westinghouse Communications, which has quietly been offering a remote access service dubbed LAN Dial Remote Access, recently catapulted over most of the competition with ISDN access to its frame relay-based offering. So far, the only other carrier to offer ISDN access to this service is CompuServe, Inc., which offers the option in nine cities.

AT&T, MCI Communications Corp. and Sprint all plan ISDN access releases later this year.

The Westinghouse service is based on Attachmate Corp. remote node software. The bridging nature of the Attachmate software allows all LAN and host protocols to be supported over serial-line protocols such as PPP, explained George Campbell, Westinghouse's WAN product manager.

One CompuServe offering also is Attachmate-based, with the same bridging advantages.

On the other hand, Sprint and AT&T support only IP connections. Meanwhile, SNA and NETBIOS have joined IP in MCI's months-old Remote LAN Dial offering (see graphic).

Novell, Inc. IPX support is on deck next quarter for both AT&T and MCI.

All the services aim to allow users to outsource the installation and maintenance of modem pools that remote users dial up to access resources on their corporate LAN. Most also move the remote access server off the customer premises and into the public network where it, too, is tended by the carrier.

However, CompuServe physically houses the server at the user's host site and remotely monitors and manages it for the customer.

Westinghouse is targeting prime outsourcing candidates with its service. These include the legal, health care and "other mid-tier markets that tend not to have large networking staffs," said Dawn Bizub, Westing-

See **Remote access,** *page 25*

Remote possibilities

Carrier	Service	Remote node software partner	ISDN access?	Protocols supported
AT&T	AT&T NetWare Connect Service	Novell	No	IP
CompuServe	Remote LAN Access	TechSmith	Yes	IPX, IP, NETBIOS, NETBEUI
	Remote LAN Node	Attachmate	Yes	All LAN and host protocols
MCI	HyperStream Remote LAN Dial	None	No	IP, SNA, NETBIOS
Sprint	Intranet Dial	3Com	No	IP
Westinghouse	LAN Dial Remote Access	Attachmate	Yes	All LAN and host protocols

Holy shrinkage! Sourcecom makes credit card size router

By Jim Duffy
Santa Clara, Calif.

Think of it as a Cisco Systems, Inc. router in your wallet.

Sourcecom Corp. claims to have brought the functionality of a Cisco 2501 router down to the size of a credit card and plans to sell it to OEMs at about one-seventh the price.

The product, InnerWare G3.5, is a multiprotocol T-1/E-1 Ethernet router that can be implanted in cable modems, data service units/channel service units (DSU/CSU), LAN switches, servers and Internet access products.

InnerWare G3.5 is targeted at remote users, including telecommuters and sophisticated residential users of broadband services. It is in a PC Card (formerly known as PCMCIA) form factor and can be inserted in any device that has a PC Card slot.

InnerWare G3.5 sports a 10Base-T Ethernet interface, a T-1/E-1 synchronous WAN port and an asynchronous management port. It also supports IP and IPX routing via static routes and the Routing Information Protocol, as well as transparent bridging, RFC 1490 frame relay and PPP.

With its PC Card form factor, InnerWare G3.5 can be easily integrated with both switched and shared-media LAN devices, Sourcecom said.

"That's going to have a big impact," said Lynn Nye, president of NetResults, a Portland, Ore.-based consultancy. "A lot of future broadband services are modeled on the Sourcecom technology right now."

Cisco's reaction?

"It's an I/O card," said Robert Spivack, a product manager for Cisco's 2500 series routers. "It doesn't have a CPU or memory," so it can't be a full-blown router.

InnerWare G3.5 is available now at a cost of about $350.

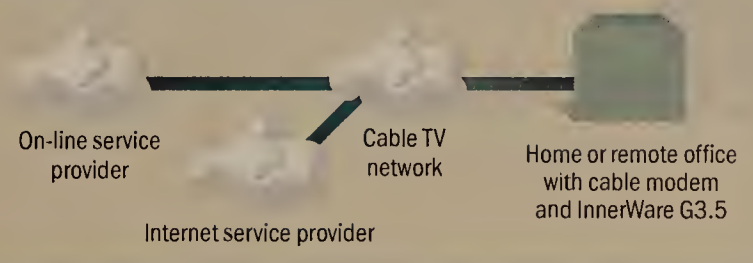
In a further assault on the remote access market, Sourcecom also rolled out a new line of IP routers with prices starting at less than $500. The InRoute line includes three models: InRoute/R, a 19-inch rack-mountable T-1/E-1 device; InRoute/D, a stand-alone desktop router that also sports T-1/E-1 links; and InRoute/DL, which has one T-1/E-1 interface and an integral 56K bit/sec DSU/CSU.

Prices for the InRoute routers peak at about $800. InRoute/R is currently available, while InRoute/D and InRoute/DL will be available in May.

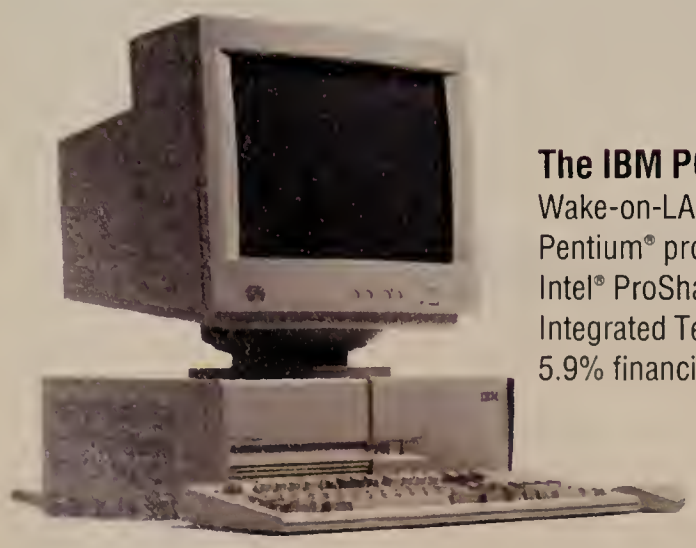
✆Sourcecom: (805) 294-0555.

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INTERNETWORKING MONITOR

Scott Bradner



A reversal of direction

Over the last few years, Apple Computer has been trying assiduously to make its computers irrelevant to the general computer user population. It was almost as if an undercover agent for the ABA Consortium (Anybody But Apple) was calling the shots from behind a curtain.

Apple's aggressive unwillingness to license its operating system, which — for most of the past dozen years — was far in advance of anything else on personal computers, was the basic problem.

Many other things confounded the issue: higher prices than the competition, a consistent failure to deliver updates on time, always disappointing second-generation products, a not-invented-here mentality, misjudging the importance of standards-based networking, constantly changing marketing plans, strained dealer relationships, a confusing array of products, an inability to articulate a consistent vision, ignoring technological innovations such as the PCI bus . . . one could go on, but you get the idea.

Apple's focus on private-label networking technology and the related disregard for the most powerful technology trend in decades — the Internet — more than offset Microsoft's attempt to ignore networking altogether (since there were a number of vendors with solutions to the latter).

Corporate information systems people have always been wary of Apple products. They seemed a bit wrong somehow, made by fuzzy California hippies or the like. More than a few corporations banned Apple machines in favor of DOS-based PCs. To me, this was like mandating tin cans and string and banning the telephone, but such is the forward thinking of some corporate IS departments.

In the past year or so, the move away from Apple has gained momentum. Apple's shrinking market share along with the introduction of Windows 95 — though hardly innovative to an old Mac hand — gave new excuses to IS staffs.

Hardly a week went by last year without another corporation deciding to cease new application development for the Macintosh. This even extended to a number of universities, once hotbeds of Mac usage and support. GUI-based internal applications, naturals for the Macintosh, would now be developed only for Windows and ported to the Mac if someone had too much time on their hands.

Apple accelerated this trend late last year when it announced that it would focus on specialty (read niche) markets such as desktop publishing and de-emphasize the commodity personal computer business. Why would a software development company make the investment in creating Macintosh applications when the market would not be there? The 80/20 rule works in this case: Developing for Windows gives you 80% (or more) of the market, so why expend the resources for the relatively small remainder?

At this point, all too many of the new Macintosh applications, where they exist, are ported from Windows and show it, like Microsoft Word Version 6.

Things may be changing at Apple. There is a new boss that has not said all that much in public. However, the licensing arrangement with Motorola is a good sign. (I would like to see a licensing deal with Compaq or some other mass-market manufacturer, but it's a start.) The way things are going, I may still be using a Mac a year from now . . . I hope so.

Disclaimer: My own positive view of the situation is not necessarily reflective of Harvard's (which is not draconian enough to mandate OS types, anyway).

Bradner is a consultant with Harvard University's Office of Information Technology. He can be reached via the Internet at sob@harvard.edu.



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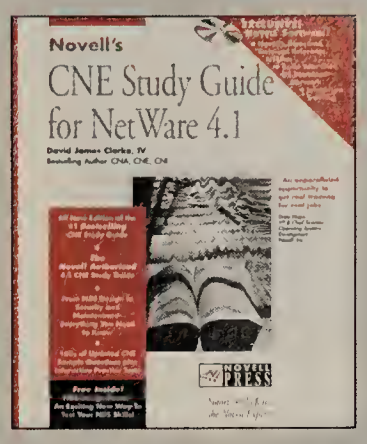
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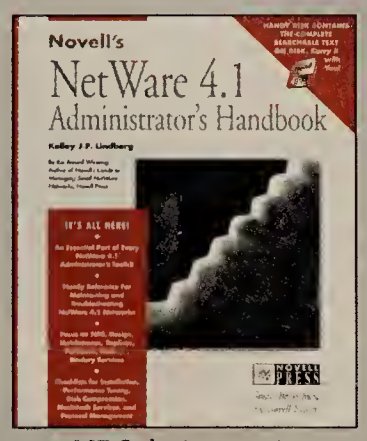
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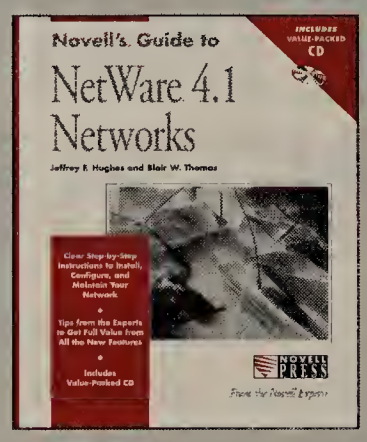
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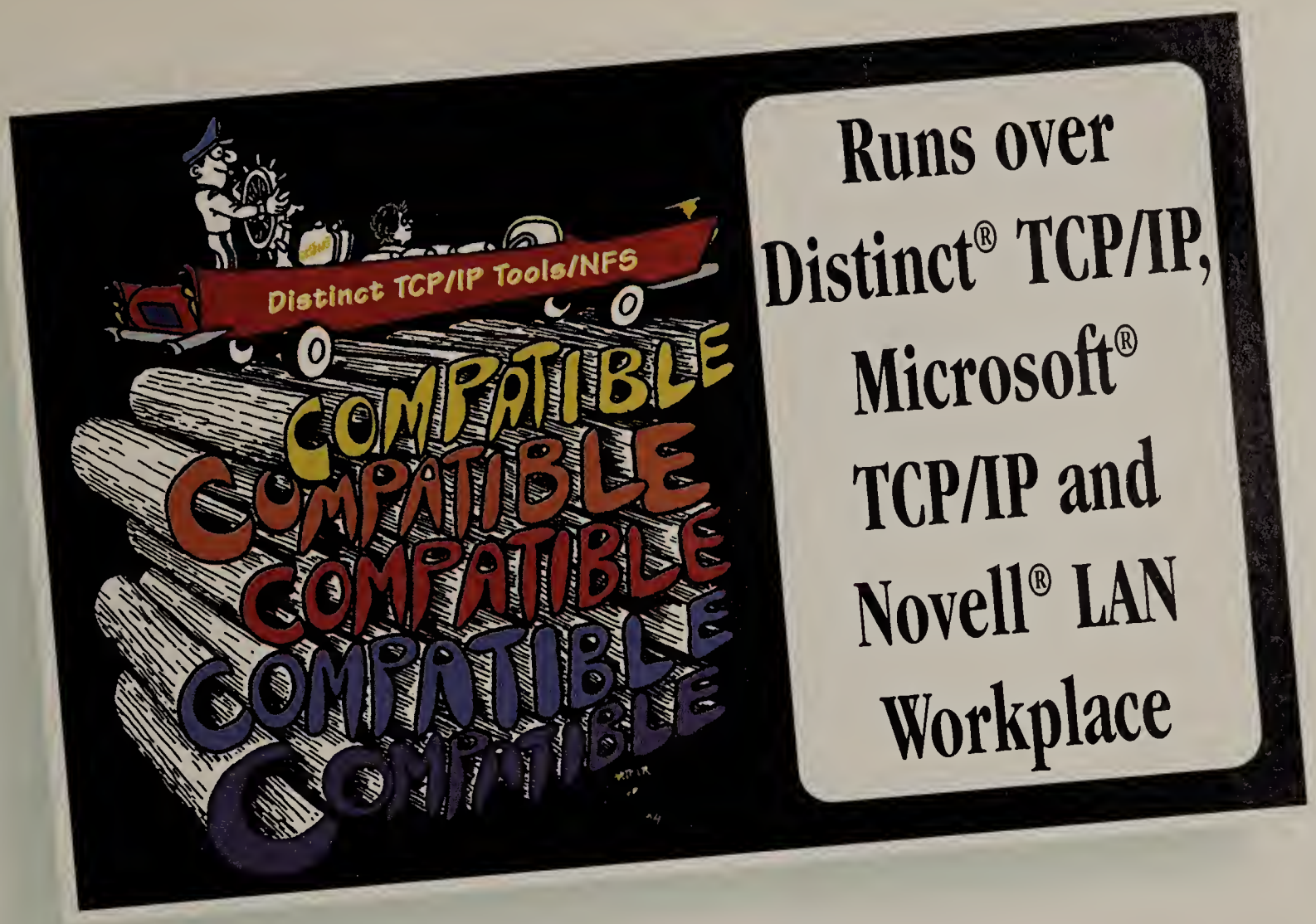
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*In-Stat, Worldwide Enterprise Remote Access Market Share, 1994

*Dell'Oro Group, Worldwide Remote Node Server Market Share, First Half 1995

*IDC, Worldwide Combined Hardware and Software-Based Remote Access Server Market Share, First Half 1995

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1 Industry: (check one only)

01. ☐ Manufacturers (other)
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03. ☐ Insurance/Real Estate/Legal
04. ☐ Health Care Services
05. ☐ Hospitality/Entertainment/Recreation
06. ☐ Media/TV/Cable/Radio/Print
07. ☐ Retail/Wholesale Trade/Business Services
08. ☐ Transportation
09. ☐ Utilities
10. ☐ Education
11. ☐ Process Industries (Mining/Construction/ Petroleum Refining/Agriculture/Forestry)
12. ☐ Government (Federal/State/Local)
13. ☐ Military
14. ☐ Aerospace
15. ☐ Consultants (Independent)
16. ☐ Carriers/Interconnects
17. ☐ Manufacturers (Computer/Communications)
18. ☐ Resellers of Computer/Network Products (VARs, VADs, Distributors)
19. ☐ Systems/Network Integrators
20. ☐ Distributors (Computer/Communications)
21. ☐ Other *(please specify)*_____

2 What is your job function? (check one only)

NETWORK IS MANAGEMENT:

1. ☐ Networking Management
2. ☐ LAN Management
3. ☐ Datacom/Telecom Management
4. ☐ IS, IT, MIS, Systems Management
5. ☐ Engineering Management
6. ☐ Corporate Management (CIO, CEO, Pres., VP, Dir., Mgr., Financial Management)
7. ☐ Consultant (Independent)
8. ☐ Other *(please specify)*_____

3 What is the total number of sites for which you have purchase influence? (check one only)

1. ☐ 100+
2. ☐ 50 - 99
3. ☐ 20 - 49
4. ☐ 10 - 19
5. ☐ 2 - 9
6. ☐ 1
7. ☐ None

4 What is your scope and involvement in purchasing decisions for network products & services for your enterprise?

A. SCOPE (check one only)
1. ☐ Corporate/Enterprise
2. ☐ Department
3. ☐ None

B. INVOLVEMENT (check all that apply)
1. ☐ Recommend/Specify
2. ☐ Approve
3. ☐ Evaluate
4. ☐ Determine the need
5. ☐ None

5 Check ALL that apply in Columns A and B:

A. I am involved in the purchase of the following products/services:
B. I plan to purchase the following products/services:

A	B	
❑ 100	❑	**LOCAL-AREA NETWORKS**
☐ 01.	☐	Local-Area Networks
☐ 02.	☐	Network Op. Sys. Software
☐ 03.	☐	LAN Storage/Backup
☐ 04.	☐	Optical LAN Storage/Backup
☐ 05.	☐	Disk LAN Storage/Backup
☐ 06.	☐	Tape LAN Storage/Backup
☐ 07.	☐	RAID LAN Storage/Backup
☐ 08.	☐	Network Test/Diagnostic Tools
☐ 09.	☐	Cables, Connectors, Baluns
☐ 10.	☐	UPS
☐ 11.	☐	Network Interface Cards
☐ 12.	☐	Peer-to-Peer LANs
☐ 13.	☐	SNMP Network Management
☐ 14.	☐	ATM Switches
☐ 15.	☐	Token-Ring Switches
☐ 16.	☐	Ethernet Switches
☐ 17.	☐	Remote LAN Access/Communications Servers
☐ 18.	☐	Superservers
☐ 19.	☐	File/Application Servers
☐ 20.	☐	Print Servers
❑ 101	❑	**INTERNETWORKING**
☐ 21.	☐	Bridges
☐ 22.	☐	Routers
☐ 23.	☐	Bridge/Router
☐ 24.	☐	Gateways
☐ 25.	☐	Intelligent Hubs/Stackables
❑ 102	❑	**COMPUTERS/PERIPHERALS**
☐ 26.	☐	Laptops/Notebooks/Sub-Notebooks
☐ 27.	☐	Micros/PCs
☐ 28.	☐	Minis
☐ 29.	☐	Mainframes
☐ 30.	☐	Workstations
☐ 31.	☐	Terminals
☐ 32.	☐	Printers
☐ 33.	☐	Cluster Controllers
☐ 34.	☐	Monitors
☐ 35.	☐	Fax/Modem Boards
❑ 103	❑	**REMOTE/WIRELESS COMPUTING**
☐ 36.	☐	PDAs
☐ 37.	☐	PCMCIA Devices
☐ 38.	☐	Wireless Data Services
☐ 39.	☐	Wireless Data Equipment
☐ 40.	☐	Wireless LANs
☐ 41.	☐	Cellular Equipment & Services
❑ 104	❑	**INTERNET/ELECTRONIC COMMERCE**
☐ 42.	☐	Internet Access Providers
☐ 43.	☐	Firewalls
☐ 44.	☐	Web Servers/Browsers
☐ 45.	☐	Internet Software Tools
❑ 105	❑	**SOFTWARE/APPLICATIONS**
☐ 46.	☐	Network Management
☐ 47.	☐	Systems Management
☐ 48.	☐	Security
☐ 49.	☐	Communications Software
☐ 50.	☐	Terminal Emulation
☐ 51.	☐	Word Processing
☐ 52.	☐	Operating Systems
☐ 53.	☐	Client/Server Applications Development
☐ 54.	☐	Database Management/RDBMS
☐ 55.	☐	Spreadsheet
☐ 56.	☐	Groupware
☐ 57.	☐	EDI
☐ 58.	☐	E-mail
☐ 59.	☐	Windows/Graphical User Interface
☐ 60.	☐	Multimedia
☐ 61.	☐	Graphics/DTP
☐ 62.	☐	Remote Access
☐ 63.	☐	Imaging
☐ 64.	☐	Suites
☐ 65.	☐	Middleware
☐ 66.	☐	Document Management
☐ 67.	☐	Database Server
☐ 68.	☐	Site Metering Tools
☐ 69.	☐	Computer-Integrated Telephony (CIT)
❑ 106	❑	**WIDE-AREA NETWORK EQUIPMENT & SERVICES**
☐ 70.	☐	Frame Relay Equip./Services
☐ 71.	☐	Modems
☐ 72.	☐	FT-1/T-1/T-3 Multiplexers
☐ 73.	☐	FT-1/T-1/T-3 Services
☐ 74.	☐	SONET
☐ 75.	☐	Inverse Multiplexers
☐ 76.	☐	SMDS
☐ 77.	☐	Asynchronous Transfer Mode
☐ 78.	☐	Diagnostic/Test Equipment
☐ 79.	☐	DSU/CSU
☐ 80.	☐	VSAT/Satellite
☐ 81.	☐	ISDN Equipment & Services
☐ 82.	☐	PBXs
☐ 83.	☐	Voice Mail/Response
☐ 84.	☐	Videoconferencing
☐ 85.	☐	Leased Lines
☐ 86.	☐	Switched Data
☐ 87.	☐	E-mail/On-line Services
☐ 88.	☐	800/900/MTS Services
☐ 89.	☐	Virtual Networks
☐ 90.	☐	Outsourcing/Systems Integration Services
☐ 91.	☐	Education/Training Services
☐ 92.	☐	None of the above (1-91)

6 What is the total number of LANs, workstations/nodes at this location/ in your organization?

At this location: LANs		Workstations/ Nodes	Entire organization: LANs		Workstations/ Nodes
1.	☐ 5,000+	☐	1.	☐ 5,000+	☐
2.	☐ 1,000 - 4,999	☐	2.	☐ 1,000 - 4,999	☐
3.	☐ 100 - 999	☐	3.	☐ 100 - 999	☐
4.	☐ 50 - 99	☐	4.	☐ 50 - 99	☐
5.	☐ 10 - 49	☐	5.	☐ 10 - 49	☐
6.	☐ 1 - 9	☐	6.	☐ 1 - 9	☐

7 Check ALL that apply in Columns A and B:

A. The following network platforms are currently installed:
B. The following network platforms are planned for purchase:

A	B	
❑ 88	❑	**NETWORK ARCHITECTURES**
☐ 01.	☐	SNA
☐ 02.	☐	DECnet
☐ 03.	☐	TCP/IP
☐ 04.	☐	Novell IPX/SPX
☐ 05.	☐	APPC/APPN/LU 6.2
☐ 06.	☐	NETBIOS
☐ 07.	☐	AppleTalk
☐ 08.	☐	NFS
☐ 09.	☐	Other *(please specify)*_____
❑ 86	❑	**NETWORK OPERATING SYSTEM**
☐ 10.	☐	Microsoft (LAN Manager)
☐ 11.	☐	Novell (NetWare 2.X, 3.X)
☐ 12.	☐	Novell (NetWare 4.X)
☐ 13.	☐	Windows NT
☐ 14.	☐	Windows NT/Advanced Server
☐ 15.	☐	LocalTalk (AppleTalk)
☐ 16.	☐	Banyan (VINES)
☐ 17.	☐	IBM (LAN Server)
☐ 18.	☐	IBM (PC LAN Program)
☐ 19.	☐	Artisoft (LANtastic)
☐ 20.	☐	Digital (Pathworks)
☐ 21.	☐	Other *(please specify)*_____
❑ 87	❑	**LAN ENVIRONMENT**
☐ 22.	☐	4M Token Ring
☐ 23.	☐	16M Token Ring
☐ 24.	☐	Ethernet
☐ 25.	☐	100M Ethernet
☐ 26.	☐	StarLAN
☐ 27.	☐	FDDI
☐ 28.	☐	LocalTalk
☐ 29.	☐	10Base-T
☐ 30.	☐	ATM
☐ 31.	☐	Other *(please specify)*_____
❑ 58	❑	**COMPUTER OPERATING SYSTEM**
☐ 32.	☐	DOS
☐ 33.	☐	Unix/Xenix/AIX
☐ 34.	☐	OS/2
☐ 35.	☐	OS/2 Warp
☐ 36.	☐	IBM MVS
☐ 37.	☐	IBM VM
☐ 38.	☐	Digital VMS
☐ 39.	☐	Macintosh
☐ 40.	☐	Windows
☐ 41.	☐	Windows 95
☐ 42.	☐	X Window System
☐ 43.	☐	Solaris
☐ 44.	☐	Other *(please specify)*_____
☐ 45.	☐	None of the above (1-44)

8 For which areas outside of North America do you have purchase influence? (check all that apply)

1. ☐ Europe
2. ☐ Asia
3. ☐ South America
4. ☐ Australia
5. ☐ Middle East
6. ☐ None

9 Do you have or plan to install client/server networks? ☐ Yes ☐ No

10 Which of the following hardware platforms are installed/planned in your company? (check all that apply)

	Mainframes A – Installed	Mainframes B – Planned		Minis C – Installed	Minis D – Planned
1. IBM	☐	☐	1. IBM	☐	☐
2. Amdahl	☐	☐	2. Digital	☐	☐
3. Cray	☐	☐	3. Tandem	☐	☐
4. Hitachi	☐	☐	4. Unisys	☐	☐
5. Unisys	☐	☐	5. AT&T GIS	☐	☐
			6. HP	☐	☐
			7. Data General	☐	☐

Which of the following do you have installed/planned: (USE NUMBERS ONLY)

	At this location: E – Servers	At this location: F – Clients/Nodes	Entire organization: G – Servers	Entire organization: H – Clients/Nodes
1. Power PC				
2. Power Macintosh				
3. Macintosh (Other)				
4. Pentium-based				
5. 80486-based				
6. 80386-based				
7. 80286-based				
8. RISC-based workstations				
9. Other				

11 What is the estimated value of networking equipment and services that you help specify, recommend or approve annually? (check one only)

01. ☐ $100 million or more
02. ☐ $50 million - $99.9 million
03. ☐ $25 million - $49.9 million
04. ☐ $20 million - $24.9 million
05. ☐ $10 million - $19.9 million
06. ☐ $5 million - $9.9 million
07. ☐ $1 million - $4.9 million
08. ☐ $500,000 - $999,999
09. ☐ $250,000 - $499,999
10. ☐ $249,999 or less
11. ☐ None of the above

12 Estimated gross annual revenue of your entire company/institution: (check one only)

1. ☐ $10 billion or more
2. ☐ $1 billion to $9.9 billion
3. ☐ $500 million to $999.9 million
4. ☐ $100 million to $499.9 million
5. ☐ $50 million to $99.9 million
6. ☐ $10 million to $49.9 million
7. ☐ $5 million to $9.9 million
8. ☐ $4.9 million or less
9. ☐ None of the above

13 Estimated number of employees at this location/in entire organization:

At this location:		Entire organization:	
1. ☐ Over 10,000	4. ☐ 1,000 - 2,499	1. ☐ Over 10,000	4. ☐ 1,000 - 2,499
2. ☐ 5,000 - 9,999	5. ☐ 500 - 999	2. ☐ 5,000 - 9,999	5. ☐ 500 - 999
3. ☐ 2,500 - 4,999	6. ☐ 499 or less	3. ☐ 2,500 - 4,999	6. ☐ 499 or less

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Isotro keeps pace with IP addresses

By Jim Duffy
Ottawa

Isotro Network Management, Inc. this week will unveil software to ease the administration of burgeoning and changing IP nets.

Isotro will unwrap a new version of its NetID IP name and address administration software that features enhanced configuration, modeling and ease of use. NetID, which runs on Windows, Windows NT or Unix, automates the management and administration of IP addresses and domain names in enterprise nets.

"It's one thing to lay out all of these addresses, but sites close, sites move, things change and it's real easy to start losing track of which address is open and which address isn't," said NetID user Vincent Miller, senior network analyst at Washington Mutual Bank in Seattle.

Isotro's competitors in the field of address administration include Accugraph Corp., Quadritek Systems, Inc. and Enterprise Systems Management Corp.

Version 2.0 of NetID includes support for BOOTP address servers, subnet modeling, templates and custom data importing. NetID 2.0 has also been unbundled into three separate tools: an administrative interface, data importing and data exporting tools.

BOOTP support lets administrators define BOOTP data in NetID's database on either a global, subnet or per-host basis. Once data is defined this way, it can be exported to a BOOTP server using bootp.tab files.

Subnet modeling enables administrators to automatically assign new hosts to a particular address range, depending on device type, once addressing and naming conventions are mapped into NetID.

The templates feature is intended to reduce the amount and ensure the consistency of data entry for similar devices. Templates also reduce the level of knowledge required to add new hosts by automatically entering BOOTP parameters and automatically generating domain names.

Lastly, custom importing is intended to populate the NetID database with data from almost any source. The custom import feature, which is included in NetID's Import Tool application, allows network administrators to im- port IP addresses and associated data from spreadsheets, text files or database exports.

Custom importing is useful for populating user-defined fields that track such information as contacts, physical location or billing information against IP addresses.

NetID is priced from $1,495 to $9,500. It will be available in April.

✆Isotro: (613) 722-1921.

Founded:	1990 by ex-Bell Northern Research officials
Based:	Ottawa
Owned:	Privately held
Employees:	18
Managed:	Business activities evenly split between professional services and network management software development

MORE ON_LINE

Pick up a primer on Dynamic Host Configuration Protocol, a BOOTP alternative that is shipping with Windows 95, on Network World Fusion (http://www.nwfusion.com). Select News+, then WANs & Internetworking.

Network World Fusion

Remote access

Continued from page 17

house's manager of product marketing.

Outsourcing can help such companies take advantage of new technologies faster.

For example, buying a managed service enabled Mikasa Corp. to "accelerate our remote access plans by as much as a year," said Don Sanginaro, the company's senior vice president. The fine-dinnerware distributor has used the Westinghouse service since last year.

And ISDN access "is an important evaluation criterion because it makes the user experience much more similar to what they get [in terms of response time] on a LAN," said Dan Merriman, a director at GIGA Information Group, a consulting firm in Norwell, Mass.

That is because ISDN basic rate service affords 128K bit/sec access speeds.

And ISDN's digital nature slashes call setup and teardown time, further relieving user response-time frustration, Merriman said.

Carrier prices range from $3 to $10 an hour per user for local dial service. ■

Siemens Rolm

Continued from page 17

stock market averages — to be accessed over a LAN or WAN. This information can assist in call routing before a transaction ever hits ACD.

In the conventional ACD scenario, call routing is based primarily on telephony criteria such as the order and number of calls in queue, as well as the length of time calls have been held.

By contrast, CallBridge 3.0 lets a potentially unlimited range of computer applications supply information to the ACD before it accepts the call in queue.

For example, a telemarketing group might route calls to available agents with the highest closing ratios rather than to agents first available, said Siemens Rolm officials.

This could either be standard procedure or used only if volumes are below target.

Existing computer-telephone integration schemes often assist ACDs in routing calls to particular agents, but they do so by exchanging information after the ACD has accepted the call in queue, explained Max Fiszer, Siemens Rolm's director of product management for applications.

The drawback is that by then, the clock is running on the user's 800 toll charges even if the data supplied shows that an agent in a different call center should take the call or that the ACD should have supplied a busy signal because no agents would be available soon, Fiszer said.

CallBridge 3.0 has been implemented at MaxServ, Inc., an Austin, Texas, firm that handles service calls for Sears, Roebuck & Co. and Frigidaire Commercial Products Co. through four call centers networked via public ISDN interfaces.

Via CallBridge 3.0, MaxServ's WAN polls ACDs at each site for activity levels and makes call routing decisions.

None of the four ACDs receives the call before routing decisions are made, saving on carrier tolls. "CallBridge 3.0 gives us a more open interface to define call routing criteria in the way that best fits our needs," said Tom Gentry, MaxServ's director of technology services.

CallBridge 3.0 is due April 30 and priced starting at $5,800 for networks supporting up to 16 stations.

For 100 stations, the price is just under $13,000, Fiszer said. Existing customers can upgrade at no charge.

✆Siemens Rolm: (800) 765-6123.

Is CallBridge supporting you?

Version 3.0 of Siemens Rolm's CallBridge link between PBXs and LANs supports the following server and client software:

Servers
- NetWare
- OS/2
- Windows NT

Clients
- Windows 3.1
- Windows 95
- Windows NT
- UnixWare
- DOS
- Macintosh
- OS/2

SOURCE: SIEMENS ROLM, SANTA CLARA, CALIF.

ISDN to be a battlefield for lower priced adaptors

By Tim Greene

Vendors expecting an imminent boom in demand for ISDN are rushing lower priced terminal adapters to market in an effort to establish their names early among new users.

An adapter price war is looming, but users should beware of trade-offs between price and functionality.

For example, Motorola, Inc.'s Data Communications Group this week released a reference design for an ISDN terminal adapter PC card — essentially an ISDN modem — that will let manufacturers make less expensive cards based on existing Motorola chips.

Even though the company said it would have new chips out by the end of the year that could drop card prices even more — below $200 — Motorola said it couldn't wait. The market is so ripe, vendors must put out an inexpensive product immediately so users will recognize the vendor name from the outset, according to Rex King, Motorola marketing director.

But part of the lower Motorola price comes from dropping the processing power from the PC card and relying on the CPU in the host PC. That means a 5% to 10% drain on the processing power of the PC, King said.

That trade-off could be acceptable for some applications, but not for others, said Andrew Prophet, principal at AP Research, Inc.

"If you're just surfing the 'Net, you're probably not doing something else simultaneously," Prophet said, so you would be unaware of the drain.

Passive vs. active

ISDN terminal adapters come in two forms, each with cost/performance trade-offs.

Passive	Active
Pro: Has no onboard processor, so it can be half as expensive.	**Pro:** Stand-alone processing won't affect speed of host computer.
Con: Saps power from the host PC.	**Con:** More expensive.

But King noted that if you were downloading a file while decoding a graphical interface format image, you would notice the drain.

With the sale of ISDN lines expected to double this year from about 500,000 to one million nationwide, customer premises equipment vendors are looking to corner as much of the market as possible, according to Sanjay Mewada, an analyst with The Yankee Group in Boston.

Mewada said vendors' deals on equipment this year will help establish their names, which they are hoping users will remember in the next year or two when looking to upgrade.

But much depends on the regional Bell operating companies. If RBOCs increase ISDN rates, it could kill user interest in the service, Mewada said. With the new telecommunications law, competitive carriers might offer the service and drive pricing down, but so far, none has stepped up to do so.

In addition, carriers are looking at another technology — asymmetric digital subscriber line (ADSL) — that can offer higher bandwidths over the same wiring used for ISDN. If ADSL can be offered at reasonable rates, carriers might push it and users might prefer it, Mewada said. ■



Let's face it. When it comes to choosing the right technology for your corporate network, you can't afford to take risks.

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Circle Reader Service #30

LAN World

A Special Monthly Section for LAN Decision Makers

Briefs

■ *Chip maker* **MMC Networks, Inc.,** *based in Santa Clara, Calif., last week unveiled an* **Ethernet/fast Ethernet processor** *that will allow vendors to create new switches with added capacity and more sophisticated features. The chipset will be used to develop switches with eight to 128 Ethernet ports, as many as 16 100M bit/sec fast Ethernet ports and an integrated Asynchronous Transfer Mode uplink. The new chip supports protocol-based virtual LANs, Remote Monitoring and Spanning Tree features.*

Optical Data Systems, Inc. and Hitachi America, Ltd. are two of the more than 10 vendors that have committed to using the new switch engines to develop products. Pricing for the next-generation 4G bit/sec switches is expected to be about $450 per port. Products are expected by year-end.

MMC: (408) 653-1810.

■ **Interphase Corp.,** *an adapter card and server vendor based in Dallas, last week announced a new family of* **25M bit/sec Asynchronous Transfer Mode adapters** *for the PCI, EISA, ISA and Micro Channel Architecture buses. The cards are designed for use in desktops running multimedia applications that require ATM's quality of service.*

The 25M bit/sec adapters support most network operating systems, including Windows 95, Windows NT, Workgroup for Windows and NetWare. Pricing for the cards, which will ship in May, starts at $345.

Interphase: (214) 654-5555.

■ *Ethernet equipment provider* **Cogent Data Technologies, Inc.,** *based in Friday Harbor, Wash., last week rolled out a four-port server adapter that supports both* **10Base-T and 100Base-T** *on the same port. The adapter, which is designed for PCI-based servers, allows customers to migrate from Ethernet to fast Ethernet at their own pace.*

The card is priced at $1,298 and is available now.

Cogent: (800) 426-4368.

HP gives customers option for 100M bit/sec switching

By Jodi Cohen
Roseville, Calif.

Hewlett-Packard Co. last week rolled out switching gear that for the first time allows its customers to deploy both 100VG-AnyLAN and 100Base-T high-speed LAN technologies.

As expected, the company unveiled a chassis-based switch with modules that support 100Base-T and 100VG-AnyLAN, as well as uplink modules sup-

See **HP,** *page 30*

HP SWITCHES INTO GEAR

Product/Description	Price	Availability
AdvanceStack Switch 200/Workgroup switch with 16 Ethernet ports and two 100VG-AnyLAN uplinks	$3,399	May 1
AdvanceStack Switch 2000/Workgroup switch with six slots for Ethernet, 100VG-AnyLAN and 100Base-T modules	$1,999	May 1
Four-port 100Base-T module for Switch 2000	$1,249	May 1
Two-port 100VG-AnyLAN module for Switch 2000	$1,249	May 1
Two-port 100VG-AnyLAN module for LAN Switch-16	$1,999	April
One-port 100Base-T module for LAN Switch-16	$1,399	April

SMP or bust

Will this be the technology to take Novell to new success?

By Ram Tackett

The dust has had six months to settle since Novell, Inc. charged into the network application services arena with NetWare 4.1 symmetric multiprocessing (SMP), but it is still not clear whether the pumped-up system will carry the company beyond the file and print domains.

One certainty is that client/server processing requires a more robust, scalable architecture than is provided by traditional network operating systems (NOS), like the basic version of NetWare.

Single-processor machines do not fit the bill in complex environments that support resource-hungry applications.

Novell is hoping NetWare SMP will help secure the company a place in the growing net application services market. This boost is needed since NetWare is slowly losing market share as customer focus shifts from file and print to application servers. The NOS market share fell two points last year, from 66% in 1994, according to International Data Corp. (IDC), a market research firm in Framingham, Mass.

Network World Fusion

Need more information on NetWare SMP?

Find it on Network World Fusion (http://www.nwfusion.com).

From the main menu, select NetRef, Technology Resources then LANs/NOSes.

According to IDC, file servers account for nearly 75% of worldwide LAN shipments today. But application servers will fuel the growth in the LAN server market through 1998 and beyond, the firm said.

Breaking the bottleneck

Like other SMP platforms, NetWare SMP attempts to do away with CPU bottlenecks by allowing multithreaded applications to run over more than one processor at a time. This lets servers accomplish more work in less time.

Novell revamped some core server processes to enable multithreading in NetWare SMP. It has added performance and scalability enhancements to the LAN Open Datalink Interface (ODI) modules, the NetWare Loadable Module environment, the RSA encryption code, the SPX protocol and the NetWare Multiprotocol Router.

As can be expected, NetWare SMP fared better than the base NetWare 4.1 product in throughput comparisons. Novell tested the two systems by running servers supporting file and print activity under a heavy database load.

When it simulated 350 Oracle Corp. clients, Novell did not find any significant degradation of

See **SMP,** *page 35*

LANovation ties software distribution to NDS

By Kevin Fogarty
Minneapolis

LANovation last week unveiled a new version of its software distribution product that reduces the number of steps required to administer NetWare LANs.

LAN Escort 3.5 snaps into Novell, Inc.'s NWAdmin NetWare administration tool, giving network managers a single interface to create user accounts as well as download and configure desktop applications. LAN Escort appears as a button on the NWAdmin toolbar.

LANovation's product supports NetWare 4.1's NetWare Directory Services (NDS), which enables net managers to distribute software across a network by dragging application icons onto the names of users or user groups on multiple servers listed in the directory.

Network managers also can use LAN Escort to create accounts for users or define user groups on-the-fly and then copy that information to NDS or NetWare 3.X binderies, according to Joan Linck, director of marketing for LANovation.

That level of integration saves steps for network managers, who would otherwise use separate products for administration and software distribution, according to Sylvia Clark, an analyst at Aberdeen Group, Inc. in Boston. Using separate products can be clumsy and time-consuming, she said.

"The NDS utility is the part that's interesting about this product," Clark said. "They are providing a good level of general automation and replication of tasks that [otherwise] involve a lot of steps."

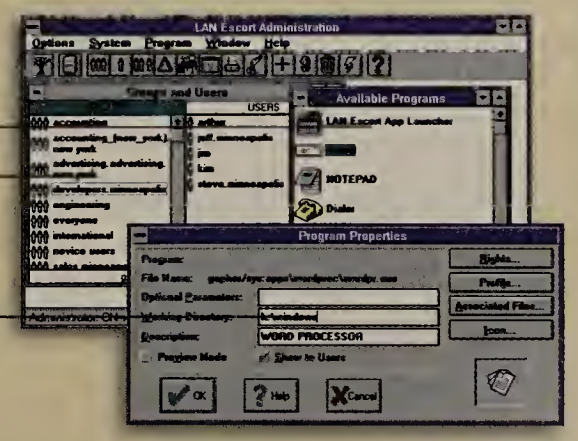
LAN Escort also can let a network manager define an application on one server or within one NDS container, then move the application without having to reconfigure it. It does that by searching for path statements and other information within configuration files, and it modifies them as the application is moved. Net managers can move applications from one server to another without having to hunt for information in the application profile.

LAN ESCORT 3.5

The software lists applications available for distribution. . .

. . .and defines the users and user groups that can access them.

A dialogue box defines properties for the applications, eliminating the need for scripting.



Pricing is based on the number of NetWare users, ranging from $1,250 for 50 users to $7,500 for 500 users.

©LANovation: (800) 747-4487.

SMP

Continued from page 27

the 2M byte/sec throughput on NetWare SMP. Throughput fell from 2M byte/sec to slightly more than 1M byte/sec on the base NetWare 4.1.

Processing power

Theoretically, NetWare SMP is designed to run on as many as 64 processors. However, SMP implementations vary among system vendors — Novell for the first time in its history is selling a product exclusively through OEM partners.

NetWare SMP supporters

The following companies have committed to reselling the symmetric multiprocessing version of Novell's NetWare network operating system:

- Acer America
- AT&T GIS
- Compaq
- Dell Computer
- Digital
- Fujitsu America
- Hewlett-Packard
- Hitachi America
- IBM
- ICL North America
- NEC America
- NetFRAME Systems
- Ing. C. Olivetti
- Sony
- Toshiba
- Tricord Systems
- Unisys
- Zenith Data Systems

Acer America Corp., for instance, supports dual Pentium processors while IBM sells systems that have from two to six Pentium processors. Then there's NetFRAME Systems, Inc., which markets systems supporting from two to 12 processors — four for SMP system processes and eight for server I/O. The majority of system vendors support four processors.

Don't expect performance to increase by orders of magnitude with each additional processor. A two-processor server can almost double the performance of its single-processor counterpart, but a four-processor server generally only triples the performance.

Novell cautions that applications may not run any faster on an SMP server than they do on a single-processor unit unless they are choked by a CPU bottleneck in the latter. Applications constrained by I/O throughput or disk access limitations won't necessarily benefit from additional processors. On-line transaction processing and other applications with large databases, such as inventory and order entry, derive the most benefit from multiprocessing.

Novell conducted a survey and learned that approximately 20% of its customers already use some sort of SMP processing, whether it be through NetWare SMP, Microsoft Corp.'s Windows NT or a Unix variant. The survey also showed that 40% of Novell customers plan to take advantage of the technology in the near future.

Futures game

Novell envisions future NetWare SMP applications driving portions of the Internet, serving advanced storage management, running directory-enabled applications and providing systems management.

For now, most users are in the tire-kicking stage. "You are going to see really serious deployments only in another two years or so," said Ted Julian, editor of "The Gray Sheet," an IDC newsletter.

Novell offers several recommendations for users working with NetWare SMP. To minimize I/O traffic bottlenecks, for instance, it suggests setting up multiple LAN channels — three or more LAN adapters — in dual-bus servers.

It also suggests using interrupt-driven LAN drivers rather than those that rely on polling. Due to the multithreaded ODI layer, NetWare 4.1 SMP LAN activity will automatically take advantage of multiprocessors. To get the best performance, Novell also recommends using a high-speed LAN, such as fast Ethernet or FDDI.

Tough competition

Novell will not have an easy time cracking the application server market. Although NetWare has a commanding market share lead among the more than 40 million users worldwide, Microsoft's Windows NT Server is creeping into the scene.

The Microsoft platform held nearly 15% of the NOS market during the first half of 1995, and support is growing fast, according to IDC. This success is due largely to Windows NT's scalability as an applications server, said Lee Doyle, IDC's director of LAN research.

Another market research firm, Gartner Group, Inc., found that almost 90% of Novell's customers are installing or considering Windows NT Server. Companies are either supplementing the file and print services they get from NetWare with application services on Windows NT or they are replacing NetWare entirely, said Dave Capuccio, vice president and research director of network technologies at the Stamford, Conn.-based consultancy.

Many users are moving to Windows NT because they find that the hardware and software costs are lower than those associated with NetWare SMP. Cowen & Co. saved money by using Microsoft's BackOffice client software licensing rather than using NetWare or Unix, according to Alistair McDougall, a consultant with the New York financial services firm. He also noted that third-party database engines are less expensive on Windows NT than on the other two operating systems.

IDC estimates that Windows NT will gain the most market share of any NOS through 1998, solidifying its No. 2 spot behind NetWare.

Even if Novell's customer base remains loyal and chooses NetWare for application services, the company still faces three major stumbling blocks. First, many users simply don't need the kind of horsepower SMP offers. Most servers still provide file and print services, neither of which are CPU-intensive.

Second, SMP-based operating systems and the applications that require them are immature.

Last, hardware vendors still cannot provide performance boosts in proportion to the number of processors. Remember, throwing four processors into an SMP server doesn't quadruple the system's performance.

At this stage, NetWare SMP may be too little, too late. Most of the early corporate adopters already have moved to Windows NT or a multiprocessor variant of Unix. Turning this tide will take a clear vision for NetWare and some cutthroat, rock-bottom pricing from Novell and its partners.

Tackett is an industry analyst with Currid & Co., a research and consulting firm in Houston. He can be reached by phone at (713) 789-5995 or via the Internet at tackett@currid.com.

Certified network pros know their LAN stuff

This quarterly review of LAN certification programs takes a look at the Network Professional Association's effort.

By Ron Nutter

If you are looking for a well-rounded LAN manager, the Network Professional Association (NPA) has created a certification program that will help you zero in on the right choice.

The NPA, in conjunction with organizations such as the Institute for Computer Uses in Education, the National Organization for Competency Assurance and Sylvan/Drake Prometric, has established a benchmark for identifying the best-of-breed LAN managers. It did so by developing a stringent certification called Certified Network Professional (CNP).



CNP applicants must already be certified by at least two NPA-approved vendors (see graphic). They also must have two years of verifiable employment in the networking profession and a passing score on the CNP exam, which covers client and network operating systems, hardware, protocols and topologies.

Candidates who pass the CNP exam do not do so on a fluke. The NPA has structured the questions in such a way as to eliminate the possibility of people passing the test because they made some lucky guesses.

The NPA enlisted the help of psychometricians — people devoted to the study of writing tests — to make it extremely difficult to get a correct answer through the process of elimination.

Passing the test, which requires a score of at least 70%, is even more difficult because study manuals are not yet available. Study guides are being written by six courseware developers, but until those are ready, the only material at a candidate's disposal is a list of topics that are covered. The list can be obtained from the NPA, located in Provo, Utah.

The CNP application requires that candidates provide information on their industry experiences and identify certifications already held. The NPA contacts all references and verifies the certifications.

Applicants also must sign a code of ethics that covers professional conduct and compliance with industry laws and regulations. For example, they must agree not to violate manufacturer copyrights or licenses. The NPA maintains an ethics committee that will check reported violations.

In order to keep certification quality high, the NPA has established a recertification process. Each year, LAN managers must prove they are worthy of the CNP designation. They must show that during the year they have had at least four months of qualified experience and have continued their education via seminars and conferences, formal training or self-instruction. Individuals must earn at least 20 education units to be recertified. Each unit represents from three to six hours of education.

The CNP certification answers a need in the industry for a professional certification that is not based on any one vendor's view of technology. It is recognized as an important step toward the establishment of a standard for net professionals.

For additional information on the CNP certification, contact the NPA at (801) 379-0330, Ext. 272.

Nutter is a contributing editor to Network World *as well as a Novell, Inc. Master CNE and Compaq Computer Corp. ASE in Lexington, Ky. He can be reached via the Internet at rnutter@world.std.com.*

Stepping-stones to CNP

LAN managers must hold two of the following certifications to apply for the Certified Network Professional title.

Vendor	Certification
Banyan	Certified Banyan Engineer
CNX Consortium	Certified Network Expert (all versions)
Compaq	Accredited System Engineer (all versions)
IBM	Certified LAN Server Engineer; Professional Systems Engineer
Lotus	Certified Lotus Professional
Microsoft	Certified Systems Engineer
Novell	Certified Novell Engineer (CNE); Master CNE

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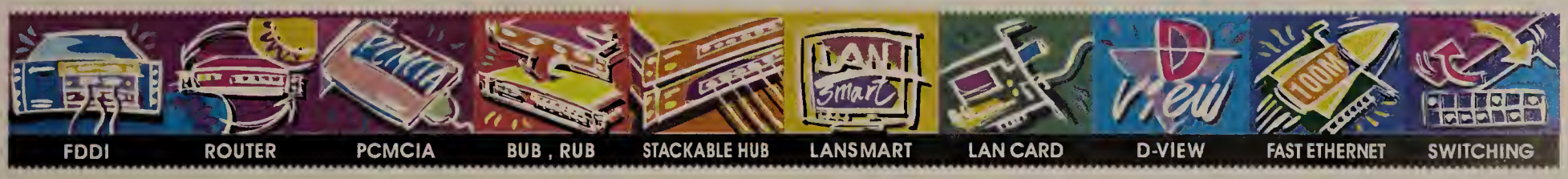
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WIRED WINDOWS

Warp Server is no skin off NT's nose

The lead paragraph of a story in my hometown newspaper caught my eye last week: "IBM . . . expects to take a big step toward becoming a bigger player in network operating system software for personal computers."

Since IBM is virtually a nonplayer in today's LAN marketplace, my interest was piqued. After all, we've heard good things about the "new" IBM. Closer inspection, though, has led me to believe that IBM has tripped once again while trying to take that big step.



Dave Kearns

IBM last week introduced OS/2 Warp Server and OS/2 Warp Server Advanced, and I can tell those of you running Windows NT servers that you have nothing to worry about. Neither do Banyan Systems, Inc., Microsoft Corp. or Novell, Inc.

A natural follow-on to LAN Server, but now carrying the Warp name (perhaps hoping to capture the all-important Klingon market), the two products offer little that isn't in NT Server and wasn't in NetWare 2. Well, there's one thing; I'll get to that shortly.

OS/2 Warp Server appears to be targeted at the entry-level market — small businesses with no current network — while Warp Server Advanced might be aimed at the downsizing market, in hopes of keeping those folks within the IBM camp.

IBM promoted the products as being able to support concurrent access to files, applications, printers and modems from a single LAN server. IBM also said it gives you all the software you need to introduce net technology to your business. That shows you the customer IBM is targeting.

But wait, that's all in the standard package! Buy Warp Server Advanced and you get the high-performance file system, disk mirroring and disk limit administration, which allows you to limit the size of subdirectories. Hold me back, Hannah!

Well, maybe it's inexpensive. Warp Server is listed at $629 and Warp Server Advanced at $1,299. The software is based on the NT pricing model — a set price per server and an additional charge for each client. But maybe I should let IBM's words speak for themselves:

"OS/2 Warp Server and OS/2 Warp Server Advanced contain features that are subject to separate use-based charges. You must acquire one UBF for each user (UserID) registered to use or access Chargeable Services (defined below). This access may be to one or more OS/2 Warp Servers within your enterprise and to OS/2 LAN Servers or OS/2 LAN Distance Connection Servers within your enterprise. The total number of users accessing Chargeable Services cannot exceed the number authorized by the applicable Proof of Entitlement. If the total number exceeds the number in the Proof of Entitlement, you must notify IBM or its reseller to purchase more UBFs as stated in the IPLA."

Uhhh, yeah. As soon as I find my IPLA, I'll figure out what it's going to cost.

I did say there was one thing that appeared to be new, from a LAN operating system standpoint, and that's an ability to remotely control or monitor any attached PC. It's a feature many net administrators would like, but it's not enough to make me change my NOS.

Interestingly enough, IBM also just announced a PowerPC-based server dubbed the F30. It supports either AIX or NT Server. There are no plans to port Warp Server to it.

Kearns, a former net administrator, is a freelance writer and consultant in Austin, Texas. He can be reached at dkearns@msn.com.

Tip of the week

If you get annoyed by things like splash screens — those little billboards that pop up while a Windows program loads — then visit http://www.creativelement.com/win95ann/index.html. Check the Third Party Annoyances section for Windows 95 registry tips on disabling nagging little features.

Apple makes server inroads with PowerPC

By Ben Heskett
Boston

Apple Computer, Inc. last week announced four PowerPC servers, two of which the company hopes will dissuade customers with Macintosh clients from going to other vendors for Unix-based servers.

The company's new Network Server Models 500 and 700 represent Apple's foray into the true departmental server market, industry observers said. Previously, Apple's servers were largely desktop systems packaged with server software, they said.

"It's really an industrial-strength server for the first time," said Peter Hartsook, publisher of "The Hartsook Letter," an industry bulletin that covers Apple.

The Network Server 500 and 700 include 132-MHz and 150-MHz PowerPC processors, respectively, running IBM's AIX Unix operating system. The machines are designed to run file and print services, as well as applications such as imaging and workflow. Targeted markets include publishing, education and business. The servers feature six PCI card slots and support for seven internal SCSI devices and two serial ports. The servers support Ethernet, AppleTalk and TCP/IP.

Apple also introduced a pair of low-end servers, called the Workgroup Server Models 7250 and 8550. The 7250 and 8550 include 120-MHz and 132-MHz PowerPC processors, respectively, running the MacOS 7.5.3 operating system featuring Open Transport 1.1 — a new version of Apple's multiprotocol transport utility.

The servers are targeted at small LANs at schools or businesses. They include three software bundling options: electronic mail and databases, Web site development applications for Internet publishing, and file and print services.

The servers have three PCI card slots and support one or two SCSI buses. The servers have built-in Ethernet and LocalTalk capabilities, support for AppleTalk and TCP/IP, and optional token-ring support.

The Network Server 500 starts at $8,819, and the 700 starts at $11,829. Pricing for the Workgroup Server 7250 starts at $2,889, and the 8550 starts at $7,199.

SERVER SPLASH

Apple
- Power PC-based Network Server 500 and 700
- Power PC-based Workgroup Server 7250 and 8550

Hewlett-Packard
- New processor boards and Web software

NetFRAME
- MessageCluster server supporting NetWare 4.1, GroupWise and NetWare Web Server

HP serves it up

In other server news, Hewlett-Packard Co. this week will introduce more powerful symmetric multiprocessing capabilities for the 9X9KS model systems within its 3000 server family.

The company is offering chip upgrade boards consisting of one to four of its new 120-MHz PA-RISC 7200 processors. The new chips can improve processing performance over HP's 100-MHz chips by 20%. The chip upgrades start at $19,000.

HP also said it has struck a deal with Open Market, Inc., which will write Web server software for the HP 3000 servers. The Open Market software will be available in April for $1,650.

NetFRAME packages Novell

Separately, NetFRAME Systems, Inc. introduced an integrated messaging server last week that bundles Novell, Inc.'s network operating system, groupware and Internet software in one box. The MessageCluster server features NetFRAME's unique approach to I/O, which includes up to four 100-MHz Pentium chips to process applications, as well as a 486 processor to handle I/O tasks such as message routing or Internet access.

The MessageCluster will ship at the end of the month and is priced starting at $39,950 for a 250-user system.

✆Apple: (800) 538-9696; HP: (408) 553-5300; NetFRAME: (408) 944-0600.

HP

Continued from page 27

porting the competing 100M bit/sec technologies for its existing 16-port Ethernet switch (*NW*, Jan. 22, page 1). Also, HP added an Ethernet-to-100VG-AnyLAN workgroup switch.

Until now, HP customers were force-fed 100VG-AnyLAN for 100M bit/sec server and backbone connections. And even though VG is still HP's fast LAN technology of choice, customers will now be able to intermingle the technologies or decide for themselves which one best suits their needs.

"This is not a signal that they are giving up on VG, but this is their way of addressing their customers' needs by being able to offer different types of uplinks," said Diane Myers, senior analyst at In-Stat, a consultancy in Scottsdale, Ariz.

HP's AdvanceStack Switch 2000 modular switch is designed to provide better net segmentation for improved performance. The six-slot chassis, which has a 1G bit/sec backplane, can support any combination of Ethernet, 100VG-AnyLAN, FDDI, 100Base-T and Asynchronous Transfer Mode modules.

HP will initially roll out a four-port Ethernet module and two-port 100VG-AnyLAN module. A one-port FDDI module will ship in October, and 100Base-T and ATM modules are slated to ship by year-end.

Network World Fusion

Download primers on 100VG-AnyLAN and 100Base-T from Network World Fusion (http://www.nwfusion.com). Select News+ then Local Networks.

The switch supports port-level virtual LANs, protocol filtering and broadcast throttling.

HP also rolled out 100VG-AnyLAN and 100Base-T uplink modules for its Ethernet LAN Switch-16, which provides links between 10Base-T and 100M bit/sec workgroups, as well as high-speed links to servers.

In addition, HP unveiled the AdvanceStack Switch 200, which is targeted at small workgroups adding 100M bit/sec links for server access.

The device, offering 16 10Base-T switched ports and two 100VG-AnyLAN dedicated ports, would typically sit atop a stack of AdvanceStack hubs to reduce congestion.

✆HP: (800) 533-1333.

NET RESULTS

Evaluating your RFP responses

Second of a two-part series

Writing a request for proposal (RFP) and delivering it to prospective campus LAN vendors is only half the battle.

Responses to the RFP must then be evaluated against the requirements set forth in the document to judge the best solution. This is not an easy task.

If the RFP was prepared as outlined in last week's column, then a framework can be used to apply a weight or score to each part of the RFP and come up with a total score for the response. By comparing these final scores, a short list of potential campus LAN suppliers can be quickly reached.



Skip MacAskill and Melinda Le Baron

This evaluation method can save decision and purchasing time, and can be used as the foundation for a business plan to be forwarded to senior management.

■ **Initial checklist.** Make an initial checklist of questions and grade responses to weed out those that obviously are not worth a full evaluation. Checklist questions should include: Does the pricing look reasonable? Is the company stable enough to do long-term business? The answers to these questions should be a first impression, not an exhaustive evaluation.

■ **Prioritizing the top three.** Determine the three most important sections of the RFP and how those rank in relation to one another. This decision is the most important in the evaluation process, as it provides the basis for the framework and scoring of each response. You can then decide if the most technically sophisticated solution will win out over the least expensive one, for example.

■ **Fleshing out the sections.** Your evaluation framework should consist of three sections representing the three prioritized sections of the RFP. A spreadsheet program can be used to do the calculations. Under each of these sections, requirements should be listed.

■ **Allocation of points.** Rate the priority of the three sections based on a 100-point system. As an example, let's allocate 60 points to the overall solution, 30 points to the pricing and 10 points to the vendor's background and financials.

The solution section is heavily weighted to be the definitive factor in evaluating the responses. If product requirements are met, it constitutes 60% of the total points and, therefore, will greatly change the score for the response. The second section constitutes 30% of the response, and while it will play a deciding factor in the score, it will not sway scores much if product requirements are not met.

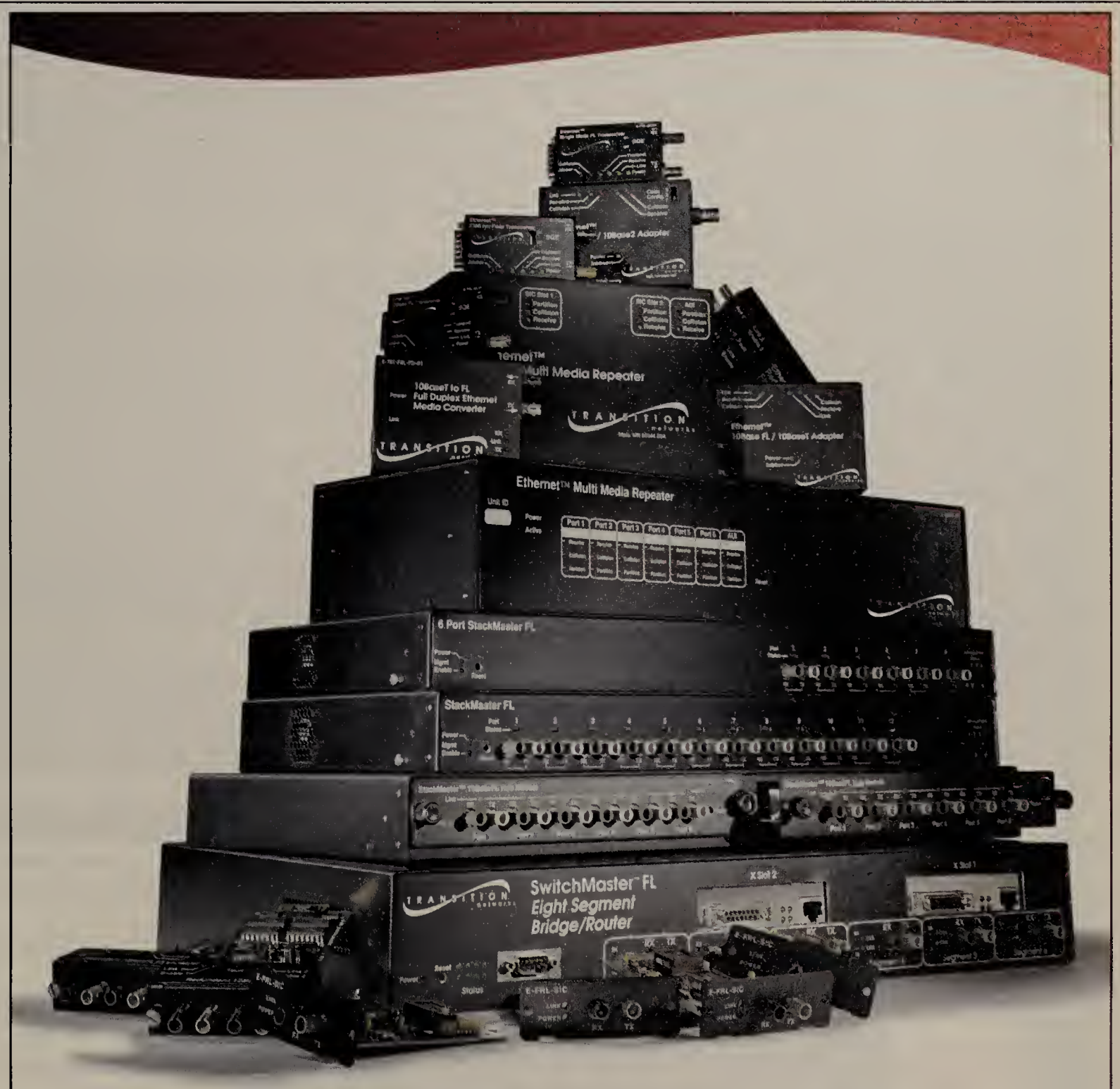
The third section does not carry much weight, being only 10% of the total points, but may provide a discretionary difference if two companies' solutions meet the two previous sections' requirements.

Once the requirements have been included, the total number of points for each section should be divided by the number of requirements. This will give a point total for each requirement for that particular section.

After the scores are tallied, it should be simple to make a short list of vendors or, in some circumstances, clearly highlight the vendor with the best solution.

If the result is not clear, then rethink the prioritization and use the model again for added insight into the strengths of each response. The results will save time and effort in evaluating the RFP responses.

Le Baron is a research director and MacAskill a senior research analyst in Gartner Group, Inc.'s Network Computing Infrastructure group. They can be reached by E-mail at inquiry@gartner.com or by phone at (203) 316-1111.



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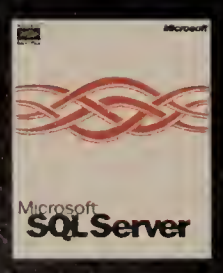
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Native ODBC Interface	Yes	No	No
Mail-Based Queries and Alerts	Yes	No	No
Extended Stored Procedures	Yes	No	No
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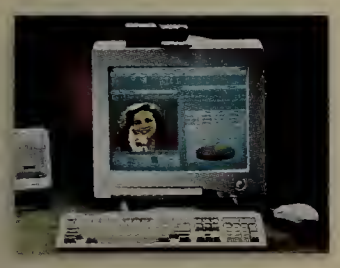
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Briefs

■ **VCON, Inc.** *last week released a* **desktop videoconferencing** *software upgrade, called LanPoint, that allows users to make video calls over LANs running TCP/IP. LanPoint is a $99 upgrade for users of VCON's Armada Cruiser line of products. To date, VCON's products have focused on ISDN, ISO-Ethernet and Asynchronous Transfer Mode networks.*

VCON: (214) 774-3890.



■ **Sinper Corp.** *in Warren, N.J., this week will announce a new version of its* **on-line analytical processing database** *and plans to change the company's name to TM1 Software. TM1 Server 6.0 processes queries hundreds of times faster than the previous edition due to a more efficient calculation engine.*

Pricing ranges from $7,000 for workgroup configurations to $300,000 for large systems.

TM1: (908) 755-9880.

■ **Everywhere Development Corp.** *of Toronto last week shipped Tango 1.5, an open database connectivity-compliant version of its* **Web/database integration tool.** *Tango connects Macintosh-based Web servers to relational databases. A version for Unix- and Windows NT-based Web servers is due next month.*

Tango costs $495 for a single-server license.

Everywhere: (905) 819-1173.

■ **Sybase, Inc.** *in Emeryville, Calif., last week shipped* **Sybase IQ** *for Sunsoft, Inc. Solaris, a database add-on that speeds up large queries using bitmap technology. Sybase IQ is priced at $32,440 for a single-processor machine supporting 32 users.*

Sybase: (510) 922-3500.

Baranof makes E-mail manageable via SNMP

By Carol Sliwa

EMAIL WORLD

Administrators longing to monitor their electronic mail systems from the same management station as their networks can now get a helping hand from Baranof Software, Inc.

The Watertown, Mass.-based company announced at last month's EMail World show in San Jose, Calif., that it has added Simple Network Management Protocol support to its MailCheck messaging management software.

The new SNMP Agent lets MailCheck convert information about potential E-mail network problems into event messages, or traps, that can be handled by central SNMP-based consoles, such as Hewlett-Packard Co.'s OpenView or IBM's NetView/6000.

"We want very badly to have centralized management for all of our network services. . .That's where the cost benefit is," said Jeff Lande, LAN administrator with the Minneapolis-based brokerage firm Dain Bosworth, Inc., a Baranof beta tester.

Nina Burns, president of Creative Networks, Inc. of Palo Alto, Calif., said linking mail management with mainstream network management should help companies reduce messaging system downtime that can cost them thousands of dollars a year.

"You're going to be able to isolate the fault more quickly. There are more tools for monitoring, diagnostics and alerts with the SNMP management system," she said.

MailCheck supports most LAN E-mail products, and the SNMP agent will work with various net management systems.

The SNMP Agent costs $495. MailCheck is licensed based on the number of post offices, gateways or other network objects being probed. A base system, at $295, can monitor two network objects. Licenses to monitor more objects are $195, with volume discounts available.

Also at EMail World:

■ **The TeamWARE Division of Fujitsu, Inc.** announced a messaging server that implements Internet standards. The Internet Messaging Server will provide native support for Internet Mail Access Protocol and Post Office Protocol clients, as well as Simple Mail Transport Protocol, Multipurpose Internet Mail Extensions and X.500.

The software is targeted for a second-quarter release on Solaris and Windows NT.

The server software price is $49 per seat for the first 10 users and scales down as users are added. Complementary client software costs $20 per desktop.

■ **Inso Corp.** of Boston released CyberSpell, a Windows-based spell checker and proofing tool for Netscape Communications Corp.'s Navigator 2.0 E-mail users.

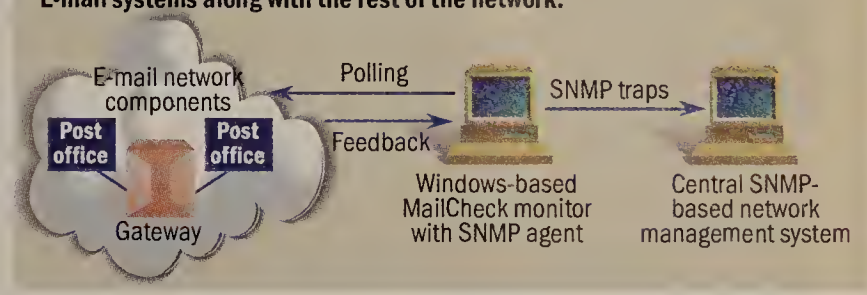
Once installed, CyberSpell is integrated into the pull-down menu of the Navigator E-mail dialog box.

CyberSpell costs $24.95. A 30-day trial version can be obtained from Inso's home page.

✆Baranof: (800) 462-4565; Inso: (800) 333-1395; TeamWARE: (408) 982-3016.

Centralizing E-mail management

Baranof has enhanced its MailCheck E-mail management software so it can forward SNMP traps to a central SNMP-based management system, such as HP's OpenView or IBM's NetView/6000. This lets administrators manage E-mail systems along with the rest of the network.



Jyacc, others build Web support into development tools

By John Cox

Client/server tool vendors are moving quickly to create interfaces between Web environments and corporate applications. Among the companies making moves in this area is Jyacc, Inc., which this month will release some preliminary Web extensions to its JAM fourth-generation language development environment.

JAM/Web Enterprise Builder (WEB) will let developers use a drag-and-drop interface to build graphical screens that can be converted into HTML format for display by a Web browser. The forms can pass requests via the Common Gateway Interface (CGI) back to the JAM Server, which translates them into SQL commands sent to a networked database.

Or JAM/WEB can pass the requests to a Novell, Inc. Tuxedo transaction monitor, which can use the JAM/Transaction Processing Interface to access networked databases or application servers.

JAM/WEB then dynamically generates the necessary HTML pages, fills in the returned data or other results and displays them in the browser.

According to Mark Jaffe, Jyacc's vice president of marketing, the goal is to bring corporate developers a fourth-generation language tool set that can build Web-based front ends and integrate them with existing two- and three-tier client/server systems.

A JAM/WEB tool kit, which includes the HTML generator, will be available free this month. The final product is due out about midyear. Pricing has not been announced.

Business@Web, Inc. in Cambridge, Mass., last month unveiled the OpenScape product line for building and assembling OLE custom controls and OLE servers, which can then be added to HTML pages to link components with back-end resources via various middleware options.

Likewise, NeXT Software, Inc. in Redwood City, Calif., offers the WebObjects product line, which is oriented around NeXT's distributed object technology and supports third-generation languages such as C/C++, Objective C and Java.

Which middleware tools vendors support and how they support them may be crucial for Web applications that need to scale.

Some vendors rely on CGI, but others see it as a potential bottleneck and bypass it.

Start-up Wayfarer Communications, Inc. in Mountain View, Calif., designed its Wayfarer QuickServer as a high-performance set of middleware services that can be called from existing client/server tools. Wayfarer inserts a fast message router between the Web browser client and the parts of an application written in Visual Basic, PowerBuilder and the like. The result is very fast WAN performance and the ability to support both high traffic volumes and large numbers of end users.

For Java programs, Open Horizon, Inc. in Belmont, Calif., recently announced Connection for Java, a Java application that connects incoming HTML requests with the company's Connection middleware, which implements Distributed Computing Environment-based services such as directory and security.

✆Jyacc: (212) 267-7722.

Network World Fusion

Drill down on Network World Fusion (http://www.nwfusion.com) for more information, including:

- **A detailed listing of existing tools for linking SQL databases to the Web**
- **A look at the OSF's DCE Web project**
- **A link to a British company seeking to join CORBA objects and the Web**

Select News+ then Client/Server Applications.

SHARED LOGIC

Getting ready for Microsoft's Exchange Server

As Microsoft Corp.'s long-awaited Exchange rollout begins, many companies are trying to decide how to deploy client/server messaging and groupware technologies.

For some, the key requirement is to slash costs by overhauling LAN E-mail post office sprawl. Others are keen to supercharge corporate productivity through groupware deployment.

Given Microsoft's position in the industry — more than nine million Microsoft Mail seats are installed — many companies will select Exchange. Should yours be one of them?

If you're planning to roll out Windows NT application servers or an NT-based LAN, consider Exchange. Ditto if you have a large installed base of Windows desktops and Microsoft Mail users.

But if your desktops and servers are and will remain heterogeneous, look elsewhere. That's a simplified answer to a complicated question. Those companies that are squarely in Microsoft's camp no doubt wonder: Is the product stable? Indications are Exchange is a safe bet.

"We're living on Exchange, have been living on it for some time and think it's ready for prime time," says early adopter Garth Keesler, staff consultant at Intergraph, Inc. Intergraph converted all 4,500 of its end users to Exchange in November, deploying roughly 500 users on each of nine servers, all at its Huntsville, Ala., site.

If Exchange is for you, here are a few tips to help get started:

■ **Allocate resources for the rollout.** While pricing and packaging details have not been released, Microsoft's internal 17,000-user environment serves as one case study for estimating the staff required. Microsoft used a team of six to plan its migration and initial 2,500-user pilot; this process should normally take a company six months.



Dan Blum

Microsoft is expanding the pilot to encompass additional sites. A team of 14 will handle start-up and installation over a one- to two-month period. Long term, Microsoft is banking on about 20 full-time support staffers to operate the network. One note about this case study: Given its homogeneous Microsoft Mail population, Microsoft has had an easier migration path than most companies will have.

■ **Plan your Exchange server topology and naming conventions.** Begin with a complete survey of sites, network connectivity and IT administrative structures. Be sure you have enough NT expertise on hand — the Windows NT Server domain must mesh properly with your Exchange Server site setups.

■ **Optimize user setup.** The Exchange client can be configured to keep the user's personal information store on the workstation, deleting messages from the server once they are downloaded. Or Exchange can be set up to always leave messages on the server, but this creates additional network traffic.

■ **Standardize on the hardware, and don't lowball your selection.** It's a good idea to leave some room to expand and use one or two standard hardware configurations. Intergraph uses dual Pentium-based machines with 128M bytes of RAM.

A final tip stems from Intergraph's experience. Though it's not required, Keesler believes in separating server functionality. He hosts Internet connectivity on a dedicated server and all Exchange public folders on another.

Blum is a principal at Rapport Communication, a messaging consultancy. He can be reached at dblum@interramp.com.



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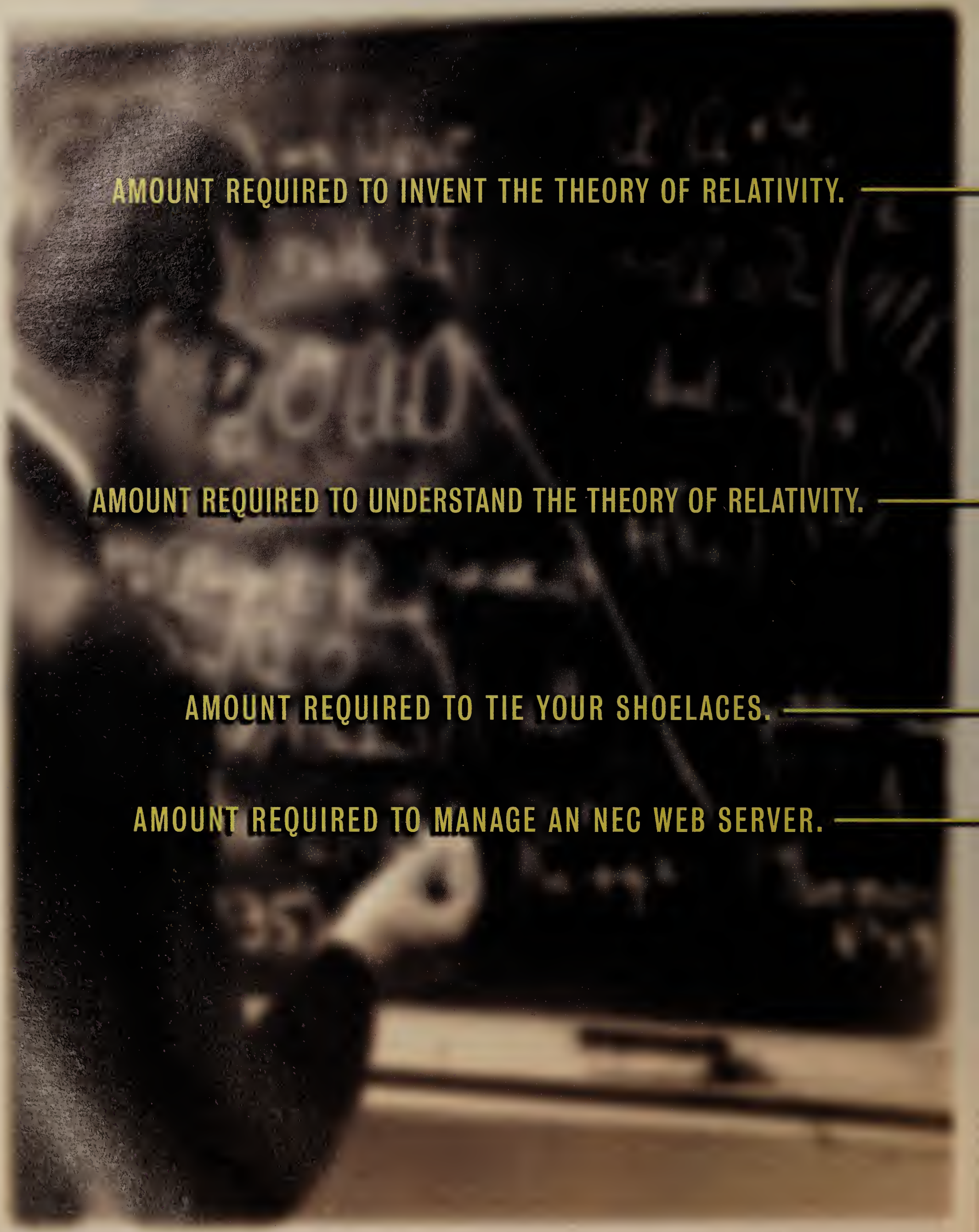
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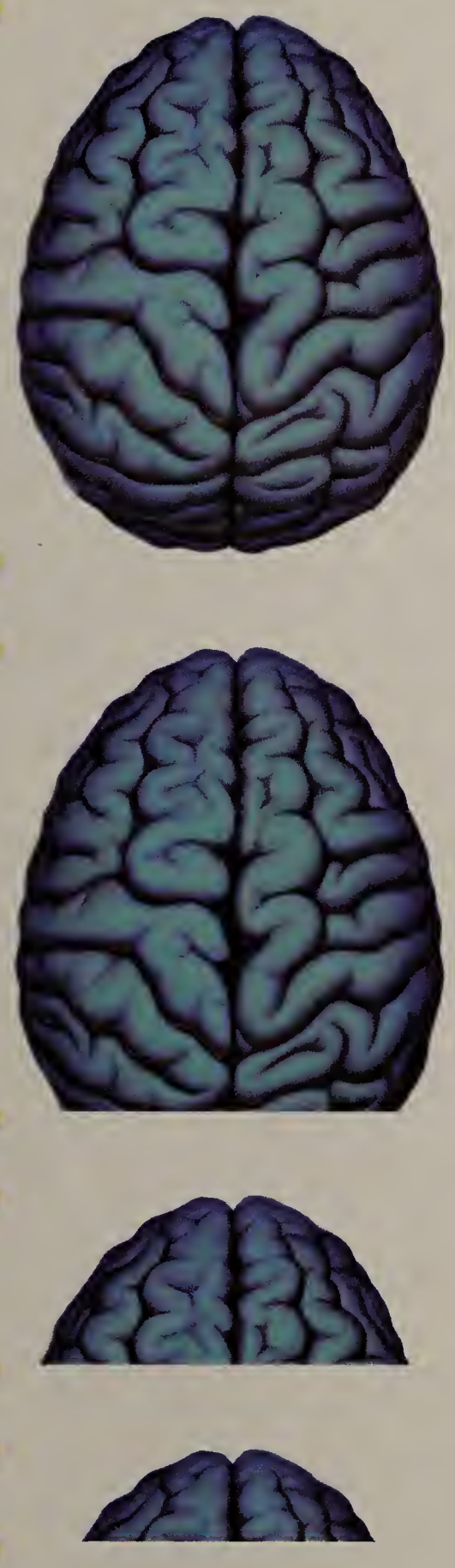
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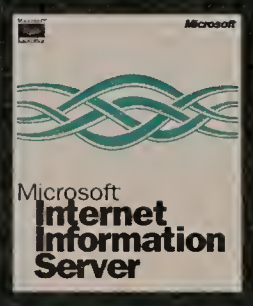
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Electronic Commerce

Covering: Tools and Techniques for Interenterprise Networking and Doing Business On-Line

Briefs

■ *An on-line guide to* **Java applets** *is available on* **the Gamelan Web site,** *a joint project of EarthWeb LLC and Sun Microsystems, Inc. The site is available through Yahoo's Java section and at http://www.gamelan.com.*

■ **O'Reilly & Associates, Inc.** *is shipping WebBoard, a multithreaded* **conferencing system** *add-on for Web servers that support the Windows Common Gateway Interface. The package works with O'Reilly's WebSite server and provides administrative functions such as activity logs, user profiles and message handling. The package is priced at $249.*

O'Reilly: (800) 998-9938.

■ *Worldgroup 2.0 from* **Galacticomm, Inc.** *is scheduled to ship in April, providing a* **catalog shopping** *program, videoconferencing utility, multimedia database, group scheduler and fax server.*

And available now for free is a Worldgroup multimedia plug-in for Netscape Communications Corp.'s Navigator 2.0, which lets users launch multimedia client/server applications from a World-Wide Web site.

Galacticomm: (954) 583-5990.

■ **IBM** *is offering* **on-line news** *and information delivery via its Web-based infoSage service, which delivers up to 30 stories twice each business day to users' individual infoSage Web page or through electronic mail.*

IBM: (914) 696-2000.

■ **Level Five Research,** *a division of Information Builders, Inc., this month begins shipping Quest Server, a data query and analysis engine that lets Web visitors* **search any SQL database management system** *data source made available on the World-Wide Web.*

Level Five: (800) 444-4303.

■ **Powersoft Corp.** *is making available on the Web the alpha versions of its media.splash and media.play software for creating* **animation** *for World-Wide Web sites.*

Powersoft: (508) 287-1500.

Usage-based 'Net access pricing en vogue

By Joanie Wexler
Cambridge, Mass.

The five Internet service providers (ISP) running coast-to-coast backbones have long had a reputation of being more expensive than their local or regional counterparts.

But recent shifts from flat-rate to usage-based dedicated access pricing could actually slash prices for small and midsize customers. Meanwhile, high-end users, such as other ISPs, may end up footing the difference.

BBN Planet recently began aping the pricing model of main rival UUNET Technologies, Inc. Both ISPs now charge for connectivity at T-1 speeds and below based on the amount of traffic the customer sends, rather than strictly by the size of the access pipe into the ISPs' backbones.

However, they charge a premium for the ability to burst to T-1 across their backbones.

MCI Communications Corp. just launched usage-based pricing for users that want to burst up to T-3 (45M bit/sec) speeds. It is evaluating a similar structure for below T-1 connectivity, according to Peter Ford, senior manager of Internet marketing.

PSINet, Inc. and Sprint Corp., the other two nationwide ISPs, still bill on a flat-rate basis.



Doing the math

BBN now monitors the number of bits received from a customer in its point of presence every 15 minutes throughout the month. Then it tosses off the busiest 5% of those increments and bills for the next-busiest 15-minute increment. This is its algorithm for calculating a monthly usage average.

UUNET figures charges the same way but monitors traffic every five minutes. Both ISPs have multiple price bands based on usage.

Given that there are 720 hours in a month, a customer could "leave the hose running" at T-1 for 36 hours per month (the top 5%) and still conceivably pay the lowest band price, noted Cliff Conneighton, vice president of sales and marketing at BBN.

The lowest band at BBN is $995, which covers average usage at 64K bit/sec or below with the ability to burst to T-1.

That monthly BBN charge can go as high as $3,275 depending on usage and the degree to which the customer buys other services, such as router management or customer premises equipment collocation in BBN's point of presence (see graphic).

The pricing is like "the car dealer who woos you with a low price for a bare-bones model, then tries to sell all the bells and whistles," said Steve Franco, program manager for interactive communications research at The Yankee Group, a consulting firm in Boston.

In fact, BBN's price shift should yield about a 50% drop in prices at the average and low end, Conneighton said. But high-end customers, such as other ISPs, should see higher prices.

Users that fill the T-1 and those that don't have been paying the same monthly price. "The playing field needed leveling," Conneighton said.

BBN said it is also poised to offer usage-based pricing for T-3 services, such as MCI is doing. MCI measures traffic in five-minute intervals, with the ability to burst to T-3 speeds. At month's end, MCI figures out which of seven bands the customer's traffic has fallen into. List prices range from $10,000 to $65,000, Ford said.

Why stay flat?

On the other hand, users' desire for predictable billing is why PSINet maintains flat-rate billing "and has no intention of changing it," according to Sally Wigley, director of corporate services. "Our customers don't find bursting attractive. It's harder to budget for." ■

ISPs: How and what they charge

Nationwide ISPs are turning toward monthly usage-based pricing to lure customers that have often turned to smaller ISPs for better prices.

ISP	Usage-based or flat rate?	List price for T-1 connectivity
BBN Planet	Usage	$995-$3,275*
MCI	Flat (up to T-1); usage (up to T-3)	$2,300
PSINet	Flat	$2,295
Sprint	Flat	$2,000
UUNET	Usage	$1,250-$3,000*

* Range includes ability to burst to T-1 and depends on average monthly usage. In the case of BBN, it also depends on equipment-related service options.

Tools guide Web page design

By Peggy Watt
San Diego

Just because technology enables almost anyone to be a Web publisher doesn't mean everybody has the eye for the job.

Start-up Digital Style Corp. of San Diego this month is shipping a selection of Web design templates that lend a helping hand to prolific Web artists, first-time page designers and the design impaired.

The WebSuite family of design tools provides templates, called style guides, of Web page designs. Each style guide offers a complete package of headline types, buttons, bullets, backgrounds and icons that the user can modify with a built-in component editor.

What's more, each component object contains metadata that communicates in HTML with the Web server, providing the image information and translating any edits for display.

The tools are available for use on Microsoft Corp. Windows platforms and work with all HTML editors, said Fred Cutler, Digital Style's vice president of marketing and sales.

WebSuite also contains several management applications, including an image manager and editor. In addition, it boasts a Load Manager that estimates how long a page will take to download at a variety of modem speeds.

"Time to load is very much a consideration in design, so the Load Manager is a useful tool," said Carl Snyder, president of La Mesa, Calif.-based Investec, which designs and manages Web sites for commodities traders and related enterprises.

Snyder said using WebSuite instead of illustration programs has cut his design time in half. A designer and typographer for years, he frequently starts with a style group and modifies it with illustration programs or directly with HTML programming.

Digital Style also emphasizes the ease of managing pages. Style can be changed across pages consistently and quickly by switching style guides.

"I've saved a lot of time using Digital Style's tools," said Jim Covington, owner of TexNet Internet Services, an Internet access provider and Web developer in El Paso, Texas. Covington provides a number of community-oriented sites.

"I choose from the different style guides which components fit best for a type of business," Covington said.

And business is the main aim. "An attractive, professional site will be more effective at promotion or sales, which is the reason most commercial sites are up to begin with," said Digital Style's Cutler.

The WebSuite Standard Edition, priced at $299, contains the complete application suite, a component editor and 10 style groups. The $529 Designer Edition adds another 15 style guides. The Starter Edition, scheduled to ship in April, will provide the application suite with a text editor only and five style groups for $199.

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Technology Update

Keeping Up with Network Technologies and Standards

NETWORK HELP DESK

Network World *tracks down answers to your questions. Please submit them to Chris Nerney via phone at (800) 622-1108, Ext. 451, the Internet at cnerney@nww.com or fax at (508) 820-1103.*

Can you recommend a good conference that will focus on network monitoring and planning for systems performance?

Terry Berinato, Cigna Corp., Hartford, Conn.

Mike Toomey, senior manager of product marketing for BGS Systems, Inc. in Waltham, Mass., says the Computer Measurement Group (CMG) holds an international technical conference each year in the U.S. and regional meetings several times during the year. You can visit CMG's World-Wide Web site at http://cmg.cs.csi.cuny.edu/cmg or call (708) 655-1812.

Toomey also suggests the Global Alliance for Managing Enterprise Systems conference being held in New Orleans from June 13-15. Call (312) 644-6610 for information.

Curtis Franklin, director of Client/Server Labs in Atlanta, suggests attending two conferences. The first, Software Development West, will be held from March 25-29 in San Francisco. For information, call (214) 245-8874.

The second, the Software Testing Analysis and Review (STAR) Conference, will be held from May 13-17 in Orlando, Fla.

Software Quality Engineering, STAR's sponsor, plans to hold a client/server class in Washington, D.C. on Oct. 3 and 4, and a Measurement Conference in San Diego from Oct. 21-24. For information, call Carol Fuller at (800) 423-8378.

If you want to follow the industry on-line, Franklin recommends two Internet sites. You can visit the comp.benchmarks newsgroup and http://www.ideas.com.au, home of IDEAS International Pty., Ltd., an Australian consulting firm that publishes the latest industry benchmarking results.

The Institute for Computer Capacity Management, a Demand Technology, Inc. company in Naples, Fla., is sponsoring a conference in Orlando from April 23-26. Check out Demand's Web site at http://www.demandtech.com or call (941) 261-8945.

Impending I/O spec makes drives portable across operating systems

By Bob Puette

I/O technology is rapidly becoming a rough spot for companies trying to build an enterprise computing infrastructure that will offer reliable service and support sophisticated applications.

The concerns over today's I/O technology fall into two areas: system performance and system integration and maintenance. While faster processors and symmetric multiprocessing (SMP) speed applications, I/O creates a bottleneck between end users and the information. (It is a bit difficult, for instance, to imagine an I/O system designed for a desktop PC keeping up with a four-way Intel Corp. P6 SMP complex.)

At the same time, the costs and overhead associated with developing and maintaining software device drivers for different combinations of operating system and I/O technology place heavy burdens on suppliers and users.

Operating system, network adapter and server vendors must develop and test an evergrowing number of device drivers, while corporations are faced with the increasingly difficult task of supporting a wide range of multivendor configurations.

Recognizing these problems, a number of leading network equipment suppliers have formed a group to collaborate on the development of an intelligent I/O specification, which they call I2O. Leading members of the I2O group include Hewlett-Packard Co., Intel, Microsoft Corp., NetFRAME Systems, Inc. and Novell, Inc.

Smart drivers

The I2O specification provides a structured environment for developing intelligent, distributed I/O subsystems. It describes an I/O architecture that is independent of the device being controlled and the host operating system.

The portion of the driver that is responsible for managing the device is separated from the specific implementation details for the operating system it serves. This means vendors will only have to write a single portable driver for a number of different operating systems.

The two segments of the driver communicate via a message-passing system based on technology developed by NetFRAME. The model is analogous to a connection-oriented networking protocol or the Open Systems Interconnection-layered architecture. The message layer is used to set up connections and exchange data and control information.

I2O is supported by suppliers of enterprise servers, operating system software and adapter cards. The initial release, due out this quarter, will support Windows NT, NetWare 4.X and UnixWare operating systems, as well as Asynchronous Transfer Mode, Ethernet, FDDI, Fibre Channel, fast SCSI, SCSI, SCSI-2 and token-ring interfaces.

Industrywide acceptance of I2O will offer a wide range of benefits for suppliers, value-added resellers and integrators, corporate IS managers and end users.

Smooth migration

For example, I2O should make it easier for corporations to adopt sophisticated new I/O technology such as ATM, fast Ethernet and Fibre Channel by bringing down the technical and management costs of integrating these technologies into an established network computing environment.

And by simplifying the task of integrating systems and supporting multiple operating system and I/O combinations, I2O will enable vendors and corporate information systems departments to implement these technologies more rapidly and cost-effectively.

In addition, since developers will no longer have to rewrite driver software for each new operating system release, they can optimize the software and make it more robust.

The I2O interface also will enable advances in fault isolation and management. I2O provides I/O cards the autonomy to hand off transaction tasks and communicate directly with one another on loading and status.

These peer-to-peer features and low latency also ease the implementation of clustering by utilizing standard hardware interfaces employing the I2O software.

In cases where these clustered systems are running heterogeneous operating systems, an I2O-compliant I/O interface can be shared.

I2O brings a new level of openness to the client/server computing environment. With a standard approach to distributed I/O processing, users will be free to combine the I/O technologies, computing platforms and operating systems they prefer.

Lastly, by providing a higher level of system reliability, I2O will simplify the integration of high-performance network computing infrastructures. The industry will be able to quickly deliver multivendor, fast I/O subsystems, while customers will enjoy mainframe-class system throughput in standards-based platforms.

Puette is chairman, president and chief executive officer of NetFRAME, a server vendor in Milpitas, Calif. He can be reached at (408) 474-4128.

Intrigued by the I2O specification?

Tap into Network World Fusion to read more about it. Select NetRef, Technology Resources then LANs/NOSes.

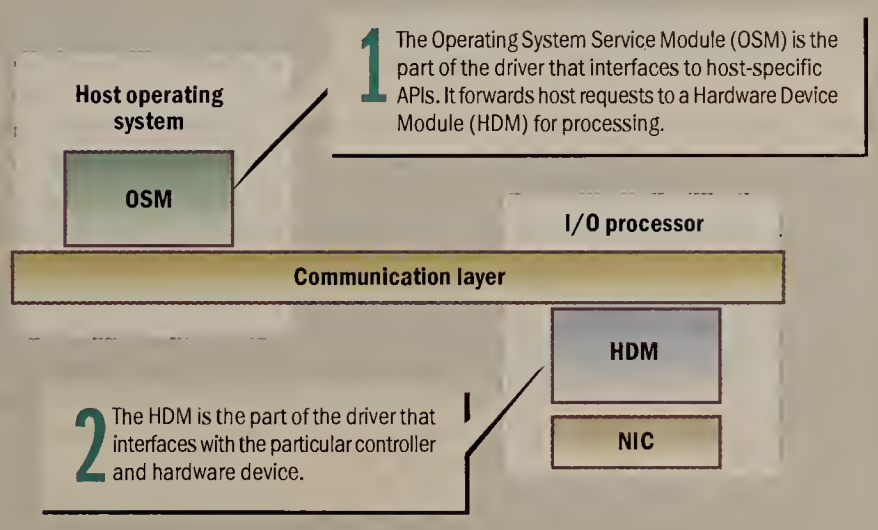
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UP CLOSE

The I2O architecture

The I2O model makes I/O device drivers portable across multiple operating systems, processors and bus technologies by splitting them in half. The two portions exchange messages via an implementation-independent communication layer.



Need information?

Let *Network World* provide a quick primer on an important or emerging technology. If you have an idea for Technology Update, contact Beth Schultz by phone at (312) 283-0213 or via the Internet at bschultz@nww.com.

EDITORIAL INSIGHTS

Notes will survive this blow

Lotus Notes took another bashing from the Internet last week as AT&T abandoned its high-profile Network Notes service — saying, in essence, that Network Notes was already obsolete given the amazing growth of the Internet. At the same time, the carrier announced a major push into the Internet access market.

Analysts called AT&T's backtracking a stunning blow for Notes and for IBM, which has paid a high price for Notes.

But that's nonsense. A cursory review of events in the on-line world indicates Network Notes was likely to have a very limited role. Despite AT&T's grand estimates of a multibillion-dollar market opportunity, Network Notes would have struggled because the model of the closed on-line service is dying.

AT&T had already dumped its Interchange service, and traditional on-line providers such as CompuServe, America Online and Prodigy — even newcomers like Microsoft — are struggling to position their services for an Internet future.



More important, Notes' future lies in the intranet, where — if IBM plays its cards right — Notes will be a key component of corporate information networks built on Internet technologies.

There is little software out there that provides the document sharing, security, replication capabilities and access to legacy information that these browser-enabled clients will need. It's one thing to put up some HTML pages, it's another to provide production applications in this new environment.

That fact isn't lost on Netscape, which shelled out more than $100 million to buy groupware maker Collabra Software. Nor has Microsoft ignored the point. It has mobilized to position NT as a premier Web server and to intranet-enable BackOffice and other key NT applications.

IBM is taking the right steps in quickly Web-enabling Notes, making it accessible to browsers, and letting users pull in Web pages and translate Notes documents to them. Certainly, more needs to be done to make Notes an open, intranet applications platform. But Notes is leagues ahead of competitors, and IBM has the money to invest in the Internet-working of Notes.

Notes' image may be tarnished because of AT&T's move, but the Network Notes debacle will quickly fade if IBM can grab the intranet opportunity that lies before it.

John Gallant, editor in chief *jgallant@world.std.com*

Teletoons

By Phil Frank and Joe Troise
guru@well.com



SPEAKING THE LANGUAGE

Workflow group was on the mark in adopting Microsoft interoperability spec



Linda Musthaler

The Workflow Management Coalition's (WfMC) agreement to use a specification from Microsoft Corp. as the basis for a new workflow interoperability standard appears, at first glance, to be another strong-arm tactic by Microsoft to get the industry to bend to its wishes (*NW,* Feb. 5, page 1).

However, when you look under the covers, you'll find that Microsoft's alignment with the WfMC's efforts results in a win-win situation for almost everyone.

The WfMC is a nonprofit, international organization of workflow vendors, users and analysts. Its mission is to promote the use of workflow through the establishment of standards for software terminology, interoperability and connectivity between workflow products. With more than 100 members, the coalition is recognized as the primary standards body for the burgeoning workflow software market.

"Since when is Microsoft in the workflow market?" you ask. As the purveyor of Exchange Server, Microsoft has a keen interest in the electronic messaging arena, and messaging is an integral part of many workflow systems. So it's easy to understand Microsoft's motives for helping to drive messaging standards through the WfMC.

To imply that Microsoft got its way in getting the consortium to adopt its standard specification is dead wrong.

But messaging is only one small portion of the total workflow picture. The WfMC is concerned with defining standards for all aspects of workflow, including electronic data interchange, application interfaces, database management, process definition, workflow engines, HyperText Transfer Protocol and more.

In fact, the coalition's standards specification is really an abstract, allowing a number of levels and methods for interoperabilty among different workflow products. Raul Medina-Mora, vice chairman of the WfMC technical committee, told me the group will try to sanction as many transport protocols as are viable. Independent software vendors (ISV) will decide how to connect them.

To imply that Microsoft got its way in getting the consortium to adopt its standard specification is dead wrong.

Microsoft has been an active member of the WfMC for quite some time. As early as last summer, the company addressed the WfMC to outline its plan for a messaging framework, known as Messaging Application Programming Interface Workflow Framework (MAPI-WF).

It just so happens that the WfMC was also developing a similar specification, known as Interface 4, which covers electronic mail transport protocols. Given the great amount of overlap between MAPI-WF and Interface 4, and the vast third-party support for MAPI, it makes sense for the two organizations to align their efforts.

And they are, with full support from the WfMC technical committee.

That's it — no strong-arm tactics, no pressure from the Bad Boys of Redmond (this time).

It's been hinted in the trade press that other vendors are concerned about Microsoft having an unfair competitive advantage as a result of its intimate involvement in the development of the messaging standard. Could this be a case of the fox guarding the hen house? I conducted an informal survey of workflow and messaging vendors to find out.

Not one vendor I spoke with — and I contacted the industry leaders — has an objection to the MAPI-WF specification being merged with Interface 4. In fact, the vendors seem to be delighted that a direction has finally been determined. None of them feel threatened by Microsoft's efforts, and most intend to support or coexist with MAPI-WF in some way. The general consensus is that you can't beat Microsoft, so you might as well join it.

The ISVs realize that Microsoft has a lot of market influence. Almost by default, Microsoft's participation in setting interoperability standards heightens awareness of the workflow market. Many ISVs like to ride the Microsoft coattails to prosperity, as evidenced by the number of workflow and messaging vendors — Lotus Development Corp. and Novell, Inc. included — that already support MAPI.

Workflow users also benefit from the vendors setting a standard. Today, there are virtually no interoperability standards for workflow. As a result, users are confused about how to build an integrated workflow system. It's difficult to communicate between products or to have one client application use various workflow engines. The emerging standards of the WfMC should help to alleviate those problems.

Analysts predict the workflow market will reach the $800 million mark by 1999. Along with document management, workflow is supposed to be one of the must-have applications in the next few years.

If you don't already have workflow-enabled applications on your network, you likely will soon. Thus, it behooves you to watch the developments in the workflow arena and plan your applications based on well-supported industry standards.

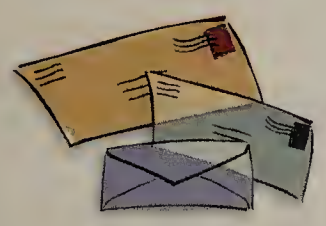
It's not too late to put in your two cents toward the emerging workflow specification, which is due out this July. You can contact the WfMC at its worldwide headquarters in Belgium through the Internet at 100113.1555@compuserve.com. You can also request details about the standards and specifications that have been confirmed to date.

Follow the coalition's progress by reading update reports and newsletters at the WfMC's Web site, http://www.aiai.ed.ac.uk/Wfmc/.

This should be an active year for standards, with compliant products emerging in the 1997 time frame.

Musthaler is vice president of research at Currid & Co., a Houston-based technology consulting firm. She can be reached at linda@currid.com or at (713) 789-5995.

MESSAGE QUEUE



Apple of their eye

Regarding your article "How Apple blew it in networking" (Feb. 5, page 1):

Why would you publish an insipid rehash of items that are stale and largely irrelevant, then sensationalize it with a provocative title on your front page? Are you jumping on the current bandwagon of negative reporting on Apple Computer, Inc.'s corporate problems?

I find the Macintosh shines as a universal client — not only does it perform as an excellent stand-alone computer, but it provides our users with simultaneous, painless connections to a variety of hosts, servers and printers using TCP/IP, IPX, DECnet and AppleTalk. In fact, most of our users are not aware of what protocols are being used, nor do they want to be. They just want to get to the information wherever it is located.

To suggest that Apple's proprietary built-in networking capability is a limitation could not be further from the truth. Not only can the Mac communicate with other network devices through standard network connections, but you can also hook up any Mac to another Mac or AppleTalk device quickly and easily.

Apple delivers superb products that are easy to use and empower our end users to accomplish what they need to do. As long as that continues, we will continue to purchase Apple products.

Robert Jewett
Director, Distributed Computing/Telemedia
State University of New York at Potsdam

Your piece about Macintoshes and connectivity sacrifices accuracy for the sake of a cute lead paragraph. The computer for the rest of us does, in fact, talk to other computers as easily as any other product.

A publication such as yours, with its specific focus on high-end networking, may perceive former Apple CEO Michael Spindler as not having been as active in that arena as he was in other markets such as home computing, small business, education and publishing. But you should also get out a little more often and see that many people actually work productively — and cooperatively — in those areas.

Dick Barton
Owner
The Write Stuff
Hawthorne, Calif.

Please don't bother to print any more "this is why Apple is bad" stories; you can just insert a big box on the front page (or, more honestly, on the Opinions page) that says "*Network World* dislikes Apple and Macintosh."

Anyone who has ever used a Mac on a network knows just how easy it is to do and how effective a client it makes (and server, too, for lower volume items). To say that I am tired of alleged news stories that deny this is a vast understatement. There are lots of things wrong at Apple — inability to keep to a single direction, lack of a management vision and way too many different products on the market at the same time. But if your publication is going to report as news such incorrect statements as "[the Macintosh] is today a much better member of the corporate network than its proprietary protocols initially allowed" — the Mac has *always* been the most adaptable network client on the market — please drop me from your mailing list.

Benjamin Grossman
Network administrator
Lake Washington School District
Kirkland, Wash.



Regarding the letters from Alan Downs and Todd Pearce about Apple (Feb. 12, page 37):

Downs' lab teacher's difficulty in networking the Mac in 1981 was probably due to the fact that the first Mac (the 128) arrived Jan. 24, 1984.

Since that time, Macs network quite well. I have presided over many large and stable Mac LocalTalk and Ethernet networks. Perhaps it's the designer of Downs' network who's responsible for its "kludgy and unstable" state.

Regarding Pearce's comments contrasting Apple's closed architecture with IBM's open one: IBM did not begin to license its technology until it began losing market share to cheap clone makers (just like Apple is doing now). The PS/2 was IBM's effort to bring the industry back to a proprietary, IBM-controlled market.

Had IBM anticipated the success of the PC, far more proprietary engineering would have found its way into the product. IBM worked with no one to create a clone industry; it lost control.

Michael Walker
Director of information technologies
Abernathy MacGregor Scanlon
New York

Editor's note: The reference to the Mac's existence in 1981 in Downs' letter was due to an editing error.

We have 28 Macs networked via thin Ethernet, and five laser printers on an AppleTalk net. You see, it's really simple to set up a Mac network. First, you connect your network cable to the network cards in each Mac, then you turn on each Mac and run the Installer program on the Apple Network Software Installer disk on each Mac. That's it. No DIP switches or jumper wires to configure, no .BAT or .INI files to mess around with. Oh, there is one more thing: You'll need to go into the Sharing Setup control panel and enable file sharing so other Mac users on the net can see your Mac's hard drive. And yes, you can limit what folders other net users can see on your Mac. With file server software, you can set read/write privileges for any folders you make available. That way you can keep hackers from messing with your system.

I would say the above network setup is definitely far from being kludgy. And stable? Our Mac network has only crashed three times in the two and a half years I've been working here. I believe those crashes were due to line noise, and the server came right back on-line when we restarted it.

After working with Macs since their inception in 1984, I don't know why anyone would mess around with MS-DOS, Windows or anything else.

Garry Kaluzny
Computer support specialist
Madonna University
Livonia, Mich.

It's inaccurate to say that Apple missed out on networking. The Macintosh started the entire LAN awareness back in 1985 when the LaserWriter was released. Macs are so easy to connect that even a 5-year-old could make a simple network in a matter of seconds.

My office has Windows machines and Macs networked in full harmony, except the Windows machines keep crashing or cannot stably run multiple networked applications at one time. The Mac users' only complaint is that no one pays attention to them because their machines do not break.

Bill Davies
Staff attorney/network manager
Central California Appellate Program
Sacramento

Apple faces an uphill battle for mind share among IS professionals who are more inclined to use PC-compatible systems and networking — not because those systems are inherently better than the Macintosh, but because they rest on familiar turf. Rather than looking at the long-term cost benefits of an easy-to-use, truly plug-and-play operating system and hardware environment, these system administrators are interested instead in the short-term benefit of not having to spend a small amount of time to learn an easier, simpler way of doing their job.

Peter Cohen
Network administrator
Corey & Company: Designers, Inc.
Watertown, Mass.

Macintosh networking is simple and stable. I suggest Alan Downs pick up one of the books on Mac networking and learn how easy it is. . .or get a consultant to do the job.

Todd Pearce comments that Apple's "'I'll do it my way' attitude. . .is a death warrant." I wonder if he's ever done business with Microsoft?

Finally, Joe Pezillo's letter (Feb. 12, page 37) states the real truth why the Macintosh hasn't captured 80% or more of the market: There would be an immediate increase in the IS unemployment rate since one Mac manager can support hundreds of Macs, while it takes scores of PC managers to support small PC LANs.

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SPECIAL LAN SWITCHING SECTION

THE SWITCHING IMPERATIVE

How LAN switching is reshaping the corporate network and what you should do about it.

By Mary Petrosky

When the number of users at Bayer Corp.'s Berkeley, Calif., site more than doubled in six months, the extra traffic was too much for the company's backbone router. "It choked and died," says Ron Puccinelli, a staff analyst at Bayer.

Puccinelli pondered his options and decided to install Ethernet switches. "We looked at beefing up the router, but that turned out to be cost-prohibitive. By going with switches, we got a lot more bandwidth and didn't have to expand the existing router."

A growing number of net managers are coming to the same conclusion as Puccinelli, embracing LAN switching because it provides a cheap means of boosting performance from the backbone to the desktop, with little disruption to the existing net. LAN switching also lets you group resources and users logically, forming virtual LANs that help you control traffic flow and support policy-based management.

Sales figures reflect just how hot the LAN switch market is. Sales of Ethernet, token-ring and FDDI switches grew from $77.8 million in 1993 to $1.1 billion last year, and are projected to reach $5 billion this year, according to Dell'Oro Group, a market research firm in Menlo Park, Calif. Ethernet switching is the runaway leader, accounting for 94% of all LAN switch ports sold.

Top technologists at McDonald's Corp. zeroed in on LAN switching's key benefits.

"The upside of LAN switching is the economics of not having to retrofit 3,000 to 4,000 PCs with higher speed interface cards. It's a good way to get bandwidth to the desktop," says Mike Disabato, manager of network strategy development at McDonald's. For Chuck Rush, a global network architect, the benefits are "increased bandwidth, availability and avoiding the pitfalls of shared Ethernet, such as collisions."

However, before you can fully realize these benefits, there are a host of issues with which to grapple. They include an evaluation of when to route vs. switch and when it makes sense to combine the two, a decision that will loom large in your switch selection process.

You will also need to determine where to place switches, whether to implement virtual LANs and how you're going to manage the new environment — all decisions this special section is aimed at helping you make.

Switch, don't route

The simple solution to bandwidth crunch is to divide your net so there are fewer users per segment and dedicate bandwidth to shared devices, such as servers.

Although routers can be used to perform this LAN segmentation, they are more expensive, more complex to administer and typically slower than switches. When the time came to boost network speed, several network managers we contacted looked at both switches and routers; invariably, they chose switches because they're cheaper, faster and easier to use.

Boston Edison Co. is one of many companies that initially tried to microsegment its network with routers but didn't like having to create new subnets and manage more IP addresses. And using routers meant some users' traffic had to cross a router to get to a local server that was now connected to a separate LAN segment.

"You try to keep 80% of the traffic local, but how do you do that if you cut the segment in half?" asks John Dubiel, manager of planning for Boston Edison. Dubiel's solution was to put multiple network interface cards (NIC) into key servers so they could reside on multiple LAN segments. However, it soon became apparent that he needed a better fix.

This year, Dubiel began deploying combination 10M/100M bit/sec Ethernet switches at the workgroup level. The switches link to hubs that are downstream on individual floors and connect upstream to two backbone routers.

"The big advantage is that the servers are still local to each segment — you have only one IP subnet for that area — and we keep 80% of the traffic local," Dubiel says.

He is hoping LAN switches also will help reduce network latency, which has become an issue as Boston Edison moves applications off mainframes onto client/server platforms. "We're seeing a requirement for more predictable network performance, and a shared environment isn't the right model," Dubiel says. "We're hoping switching will give us better predictability."

In most cases, to increase the performance of network segments, switches are a better choice than routers. However, routers are still the best bet for moving interdepartmental traffic, since they allow you to establish political boundaries and firewalls.

Something for everybody

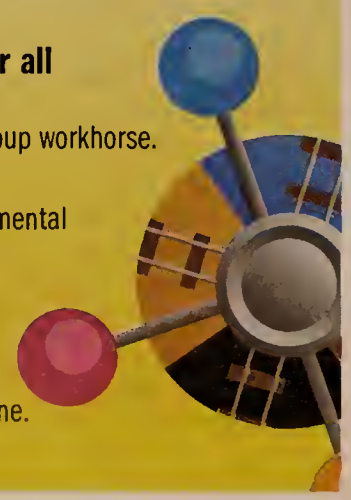
The beauty of LAN switches is you can slip them into a network to fix a trouble spot or redesign your network around switching as the core technology. Switches can be used with most of your existing network equipment, including currently installed NICs, hubs and routers.

INSIDE

Balancing performance and function: the 10/100 switch test results. *Page 47.*

A switch for all reasons:

- The workgroup workhorse. *Page 51.*
- The departmental decision. *Page 52.*
- Breathing room on the backbone. *Page 53.*



Illustrations by Paul Johnson

Out at the workgroup, switches can provide dedicated network connections to high-performance desktops and servers. They can also provide high-speed links between shared-media segments and act as an on-ramp to the LAN backbone, as in Boston Edison's case (see stories, pages 51 and 52).

Some organizations are even beginning to use LAN switches as collapsed backbone devices, placing a chassis-based switch in the network center and attaching servers and backbone routers (see story, page 53). And a number of managers have eliminated the need for stand-alone routers by using LAN switches with onboard routing capabilities.

Switch makers are looking at various ways to support routing or network layer functions within so-called Layer 3 switches. For example, some Layer 3 switches can be configured to filter on network layer information and perform broadcast control without running full network layer routing protocols. Others do offer full network layer routing, although typically they support only a few protocols; these switches are best suited for organizations with straightforward routing requirements.

Be careful to find out which type of Layer 3 functions are supported and whether the switch can be upgraded to full network layer routing. In particular, you should be aware of any trade-offs in cost, performance, functionality and interoperability with other vendors' equipment.

Support for network layer functions will add to the cost of a LAN switch, but on a per-port basis that cost will typically be less than buying a stand-alone router. While a switch's performance may suffer when you turn on full network layer routing, the overall latency will be less than if a stand-alone router was used, since packets don't need to travel from the switch to a router and back.

The virtual network

One key feature of LAN switches is their ability to support virtual LANs — groups of users, servers and other resources that are logically associated with one another, as opposed to being tied together by virtue of the physical segment to which they're attached.

Many vendors currently define a VLAN as a Layer 2 broadcast domain. All nodes in a VLAN are within the same broadcast domain, and routers are needed to interconnect VLANs, much as they are used to connect different subnetworks.

One benefit of VLANs is they ease the management burden because you can reconfigure the network — typically via drag-and-drop operations in graphical software — without hiking out to a wiring closet to unplug cables or changing subnet addresses at the desktop.

Another benefit of VLANs is they provide a mechanism for managing broadcasts in switched networks. However, keep in mind that if a VLAN crosses several switches, so will any broadcast traffic associated with it.

In addition, since all stations on a VLAN can have the same subnet address, new physical segments can be added to the VLAN without having to create new subnet addresses.

All these benefits sold Bayer on VLANs.

The company has connected 30 buildings and 1,200 endstations via switches, and it uses VLANs to limit broadcast traffic. Puccinelli says there's an average of 35 endstations per VLAN, with the largest supporting about 80 devices. He uses a single router to handle both the interconnection of VLANs and WAN access, and ultimately expects the inter-VLAN routing to be handled by the switches.

"We can break one logical subnet into multiple traffic domains," Puccinelli says. "We simplified the network design and got better traffic management."

VLANs also provide a degree of network security in that they can limit the flow of network traffic to a specified set of users. Longer term, VLANs should support a higher degree of security as the leading switch vendors

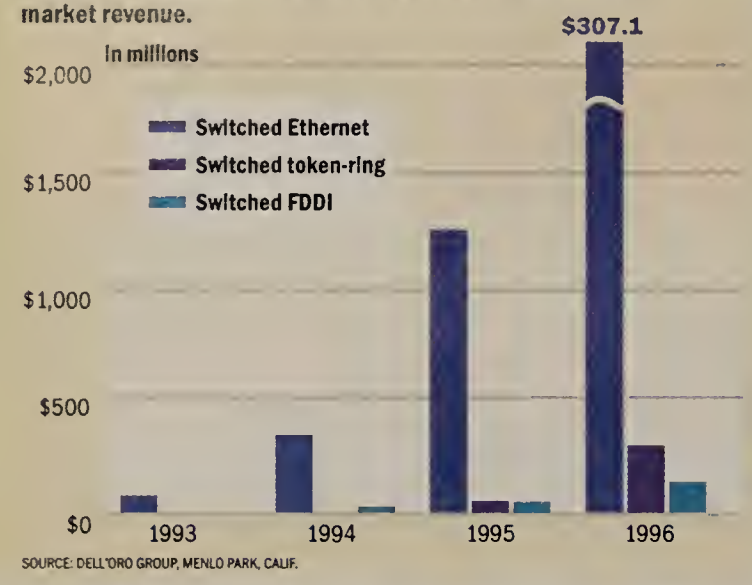
deliver virtual networking schemes that allow you to define policy-based access rights.

VLAN caveats

Bear in mind that the mechanisms for setting up VLANs vary from vendor to vendor. Efforts are under way to standardize VLAN technology, but standards won't be defined until late this year at the earliest. So if you want to use VLANs across your network, you must buy LAN switches from a single vendor.

FOLLOW THE LEADER

Ethernet is far ahead of the pack in worldwide LAN switch market revenue.



SOURCE: DELL'ORO GROUP, MENLO PARK, CALIF.

Most vendors now support port-based VLANs, while a few support other schemes, including media access control (MAC)- and protocol-based VLANs. Defining port-based VLANs is generally a drag-and-drop operation. Defining VLANs based on protocols can provide more granular control over traffic flows, but it may also mean greater complexity.

If you're using port- or MAC-based VLAN schemes, it's easiest to define a single subnet per VLAN; if your VLAN scheme parallels your subnetwork scheme, no router changes are necessary.

One of the benefits of this VLAN-to-subnet mapping is that you can logically disperse a subnetwork across multiple floors of a building as long as the subnet is within the same switching fabric. However, you must avoid having the VLAN cross the boundary of two different physical router ports unless your router supports secondary addressing or multinetting, which allows a single interface to support more than one IP address.

No sure cure

Despite their many advantages, LAN switches are not a panacea for network performance problems. You need to be clear about where your bottlenecks are before you begin sprinkling switches around your network.

For example, if slow disk drives and NICs are at the root of your performance problem, switches won't help — and could make things worse. Likewise, if too many users are accessing the same resource, such as a particular file server, providing a faster link may not solve the problem; the best solution may be to move some users to another server.

Also, keep in mind that most LAN switches are nothing more than fast multiport bridges and consequently suffer from many of the same shortcomings that traditionally plagued bridges. Organizations that built large bridged Ethernet networks, in particular, sometimes found themselves overwhelmed either by broadcast storms — since bridges simply pass broadcasts through — or by excessive administration as they set up and managed the filters needed to prevent problems such as broadcast storms.

As Boston Edison's Dubiel rolls out LAN switches, broadcast storms are one of his main concerns.

"The convergence of Spanning Tree is terrible," Dubiel says. "If a critical link goes down, the whole net must reconverge. Conversations get dropped, and everything comes to a screeching halt as the network starts to reconfigure." Dubiel hopes to avoid this problem by limiting his use of switching to the periphery of his network.

The good news is many switch vendors are starting to deliver switches that suppress broadcasts and provide some of the firewalling functions associated with routers. Some Layer 2 switches can control broadcasts through throttling mechanisms, filters and VLANs.

For example, a number of store-and-forward switches, including those from 3Com Corp., Cisco Systems, Inc. and Digital Equipment Corp., have a broadcast throttling function. You can define a threshold for broadcasts, and the switch will temporarily stop the flow of broadcast traffic if that threshold is reached. But be aware that these throttling mechanisms are typically blind to the type of broadcasts being limited.



Boston Edison's Dubiel *is concerned about broadcast storms as he rolls out LAN switches. "Conversations [can] get dropped, and everything comes to a screeching halt as the network starts to reconfigure."*

Management hole?

Another key issue with LAN switches is their level of manageability which, in many cases, is not up to the level you've grown used to with hubs.

Several network managers told us they want seamless management across hubs and switches, and even across the routed portion of their networks.

This type of cohesive management is likely to be delivered only by network systems vendors such as 3Com, Bay Networks, Cabletron Systems, Inc., Cisco, Digital and IBM.

Steve Toce, an engineering consultant with Travelers Insurance Co. in Hartford, Conn., wants token-ring switches to perform many of the management functions that bridges perform, including turning off beaconing stations and disconnecting wrong-speed devices.

Toce would also like token-ring switches to notify him of soft errors on a ring.

Other managers noted that packet-level statistics aren't sufficient when you need to troubleshoot a switched network. If a user is having trouble with an application, the network manager needs to be able to see application-level information as well as know which port the user is connected to and what device is at the other end of the user's "conversation." Remote Monitoring, especially RMON 2, is the technology most likely to give you the level of information you will need (see story, this page).

LAN switching vs. ATM

Looking down the road, some see LAN switching on a collision course with Asynchronous Transfer Mode. Indeed, ATM can be used for many of the same applications as LAN switches or used in conjunction with them. For some high-performance or latency-sensitive applications, such as scientific modeling or animation, ATM is the best technology. As LAN switches become more widely deployed, it's likely that more organizations will turn to ATM to provide the high-speed backbone necessary to support the rest of their switched infrastructure.

However, the need to purchase all new equipment, including NICs, and the high cost of this equipment are major deterrents to the use of ATM at the desktop. The fact that ATM is still an evolving technology is a major concern for many network managers, as is the lack of mature management tools.

Although ATM has been touted for its quality of service support, the LAN community is hard at work defining the protocols, such as the Resource Reservation Protocol, and switch designs needed to run multimedia applications over switched LANs. Many organizations will find that LAN switching alone provides sufficient bandwidth and other benefits to meet their needs.

Petrosky is a senior analyst with The Burton Group, a consultancy focused on network computing technology and architecture. She can be reached at (415) 572-0560 or via the Internet at petrosky@tbg.com.

RMON TO THE RESCUE

Nitin Naik, manager of multimedia and telecommunication systems for the National Aeronautics and Space Administration's Classroom of the Future project, based in Wheeling, W. Va., sums up well how a lot of network managers feel about Remote Monitoring: "You need RMON on every switch port to track statistics. And I want full RMON, not just roving."

But LAN switch vendors for the most part aren't yet delivering full RMON support, so when he needs to get traffic statistics, Naik resorts to briefly disconnecting key servers from LAN switches and connecting them to RMON-enabled stackable hubs. Not an elegant solution, but it works.

A number of LAN switch vendors do let you connect RMON probes to a specialized switch port to monitor specific segments. Others support a roving analysis port or mirroring function, which lets you attach an analyzer or probe to any switch port and monitor one or more ports.

Still, the question arises: What if a problem develops on a port you aren't currently monitoring? To address this problem, vendors such as 3Com Corp., Cisco Systems, Inc. and Cabletron Systems, Inc. have begun supporting a subset of RMON on a per-port basis. Typically, these vendors support four RMON groups — statistics, history, alarms and events — via Application Specific Integrated Circuits on some of their Ethernet switches. Some vendors allow you to monitor all four groups simultaneously across all ports, while others force you to define a subset of ports to monitor.

Several vendors, such as Cisco and 3Com, have started to implement additional RMON groups, including hosts, which provide traffic statistics for each network device; host top N, which provides a sorted view of host statistics; and traffic matrix, which shows traffic and errors between pairs of nodes.

The remaining two RMON groups, packet capture and filters, can be difficult and costly to implement switch-wide since the LAN switch must have sufficient processing power and memory to support packet analysis across all ports. Cisco supports all RMON groups on its Catalyst 1200, for example, but you must select a subset of ports on which to activate the more advanced functions.

RMON 2 will provide an even richer set of information since it enables the tracking of network and application layer data. For example, RMON 2 will allow network managers to determine which applications are running and to troubleshoot client/server applications. Vendors such as Bay Networks, Inc. have begun to implement RMON 2-like functions in advance of the specification being finalized.

More on Network World Fusion:

- **IETF info on RMON's charter and technical details**
- **An SNMP FAQ with lots of RMON info**

From the main menu, select NetRef, Technology Resources then Network Management. http://www.nwfusion.com

SWITCH TEST RESULTS

Balancing performance and function

By Rolf McClellan

Strategic Networks Consulting, Inc., working in conjunction with Scott Bradner at the Harvard University Network Device Test Lab, has tested nearly 40 Ethernet switches of various flavors over the last year. In the process, we've nailed down four key areas where you can find meaningful performance differentiation — the kind of information that can drive your own evaluations.

They are: bidirectional packet loss rate (PLR), congestion tolerance or control, and throughput and latency over the high-speed port.

Good scores in these areas are crucial indicators of whether a product has the performance to live up to all your expectations for switched internets: scalable bandwidth for power workgroups; cost-effective microsegmentation of departmental LANs; accelerated access to high-speed servers and distributed backbones; and scalable switched backbones.

Given the maturity of the 10M bit/sec Ethernet switch market, we've focused much of our attention here on switches with both 10M and 100M bit/sec ports. Pretty much any vendor can pump data between 10M bit/sec ports at wire speed with little, if any, data loss; it's when you get into the 100M bit/sec arena that things get interesting.

The test results presented here are intended to consolidate comprehensive performance data to make it relatively easy for you to pick the switches that are right for your network. To further help you along, we also define a handful of generic roles that switches may play in your network and give you guidance as to what features to look for in each scenario (see story, page 51).

Flowing both ways

We begin with tests of bidirectional Ethernet traffic. These tests provide the closest approximation to real-world networks, which involve two-way conversations and a significant number of collisions on Ethernet segments, even those dedicated to a single desktop system or server.

The PowerBits testers we use — from Alantec, a division of Fore Systems, Inc. — comply to Ethernet's specifications for backing off after collisions. As a result, the tests provide a reasonable measure of the effectiveness of the switch in forwarding traffic to congested Ethernet segments, which are the norm in collapsed backbone or departmental applications.

The amount of traffic on the link is reduced from 100% of the maximum possible load — referred to as 100% offered load — down to the load at which the PLR is 0. That load is typically 50% (25% in each direction). This covers the range of loads observed in most congested networks.



Forwarding traffic in the presence of many collisions stresses a switch's parallel stream buffer capacity and, to a much lesser extent, its parallel packet-forwarding performance. As a result, switches that do well in the congestion tests tend also to do well in the bidirectional Ethernet PLR tests and vice versa.

Figure 1 shows the effect collisions have on the forwarding rate of a typical switch with an equal amount of 64-byte traffic being sent in each direction. At 60% offered load (30% in each direction), collisions start to limit the forwarding rate to approximately 60% of theoretical wire-speed capacity. As the offered load is increased beyond 60%, the number of packets actually forwarded remains fairly constant at approximately 60% of the theoretical rate.

This general pattern tends to hold, regardless of the number of streams the switch is forwarding or the make and model of the switch being tested.

The conclusion is that Ethernet collisions, rather than switch performance, limit the maximum achievable bidirectional forwarding rate. These results are fully consis-

RESULTS IN A NUTSHELL

A number of switches performed well in each of our tests — good news for switch buyers.

In the congestion tolerance category, the 10M/100M bit/sec switches that turned in excellent results included 3Com Corp.'s LANplex, Cisco Systems, Inc.'s Catalyst and Bay Networks, Inc.'s LattisSwitch 28115. The Madge Networks, Inc. LANswitch and 3Com LinkSwitch 1000 back-pressure mechanisms also performed well in congestion control tests.



In the bidirectional packet loss tests, a few 10/100 switches with large buffers — the 3Com LANplex and Bay LattisSwitch — and the 3Com LinkSwitch 1000 with congestion control were essentially loss-free. A number of others showed slightly higher, but still negligible, packet loss.

For throughput, most of the switches with adequate port count could saturate their high-speed ports with unidirectional Ethernet streams. CrossComm Corp.'s ESS3002 and Cisco's Catalyst 5000 and Catalyst 2100 excelled, taking maximum advantage of their full-duplex, high-speed ports.

For store-and-forward latency via the fast Ethernet port, the Bay LattisSwitch 28115 and Madge LANswitch came out on top, while 3Com's switches, especially its LinkSwitch 1200, did well via FDDI.

The lowest cut-through latency via fast Ethernet was posted by the Cisco Catalyst 2100, but the other switch latencies were low enough so as not to be a concern.

— Rolf McClellan

tent with published studies of Ethernets saturated with small packet traffic, confirming the real-world nature of this test.

That means the real differentiator in these bidirectional tests is not how many packets are forwarded, but how many are lost. Therefore, the best way to measure Ethernet-to-Ethernet bidirectional switching performance is by looking at the PLR, as shown in Figure 2.

Based on the test results of a large number of Ethernet switches, it appears that the ability to buffer something on the order of 100 to 300 back-to-back packets in a single burst is necessary to keep packet loss in these bidirectional tests down in the negligible range of 0.001 to 0.05%. (See the congestion test results in Figure 3 for an empirical measure of the buffer capacity available for Ethernet ports.) Packet loss becomes appreciable — around 0.1% or more, the point at which users start complaining — when buffers are limited to 50 or fewer packets.

Filling the fat pipe

Achieving 100% of theoretical performance in switching Ethernet traffic over a high-speed port — FDDI, fast Ethernet, 100 VG-AnyLAN or Asynchronous Transfer Mode OC-3c — presents more of a challenge for switches than simple Ethernet-to-Ethernet switching.

For FDDI, translation between the different frame formats is required. For Ethernet-to-ATM, there's frame-to-cell segmentation and reassembly (SAR) to be performed. These format conversions add computational overhead that is reflected in throughput and latency.

Of the switches tested in the 10M/100M bit/sec and 10/ATM evaluations, almost all were capable of saturating their high-speed ports with unidirectional traffic. However, partly because high-speed technologies other than FDDI are still relatively new, only 3Com Corp., Cisco Systems, Inc. and Newbridge Networks, Inc. agreed to participate in this test.

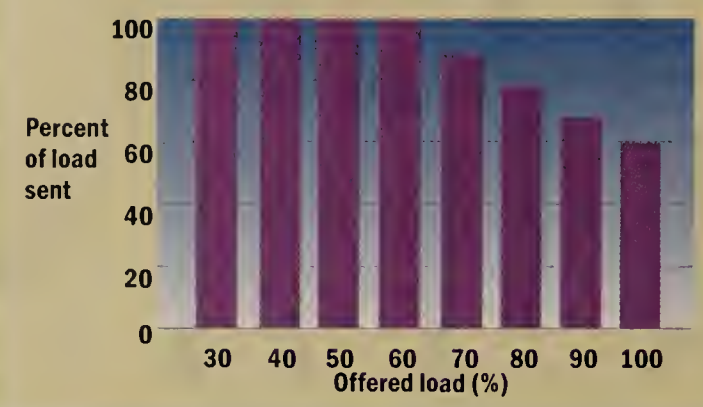
High speed, both ways

An even greater challenge for switches is to saturate a high-speed port operating in full-duplex mode with bidirectional traffic. For FDDI and fast Ethernet, this requires that the switch have 20 Ethernet ports, enough to support 10 Ethernet streams in each direction. To saturate ATM OC-3c in this test, a 10/ATM switch must have 24 Ethernet ports because it takes 12 streams of 64-byte packets to generate enough traffic to saturate an OC-3c link in one direction. For some larger packet sizes, OC-3c circuits can pass up to 14 streams of Ethernet traffic.

Of all the switches tested, only two — CrossComm Corp.'s CS3002 and Cisco's Catalyst 5000 — have the port count and throughput to fully saturate a full-duplex fast Ethernet link (10 streams in each direction).

FIGURE 1: PERCENT OF LOAD FORWARDED VS. OFFERED LOAD

(Bidirectional traffic, 64-byte packets, 3 streams)



The 3Com LinkSwitch 1000 has adequate port count (24 Ethernet ports), but it does not currently support full-duplex fast Ethernet. None of the FDDI switches tested — all from 3Com — support full-duplex FDDI at this time.

In the 10/ATM tests, Cisco's Catalyst 5000 was the only switch with enough ports to potentially saturate an OC-3c link with bidirectional traffic. But the additional cell SAR overhead contributed to limiting the Catalyst 5000's throughput in each direction to 74.1% and 60.1% for 10 and 12 Ethernet streams, respectively. This performance is still very good, the best that has been reported over ATM to date.

The throughput comparison of the Catalyst 5000 over ATM vs. fast Ethernet indicates a SAR overhead — at least in the current implementation of the ATM interface — of about 25%, offsetting the bandwidth advantage of ATM vs. fast Ethernet for traffic originating as small packets.

Dealing with congestion

The ability of a switch to deal with fully loaded ports is one thing, but being able to tolerate overloaded ports without losing packets is a tougher nut to crack.

To test how the switches handle such congestion, we converge five input streams of back-to-back packet traffic on a single 10M bit/sec Ethernet output port, as opposed to shipping the streams across the switch in parallel.

For switches without congestion control features, this stresses the effective buffer capacity available to an oversubscribed output port. A quick calculation shows that in the five-stream test, for a switch to forward 1,250 64-byte packets back-to-back without loss, it must have the capacity to buffer approximately 1,000 back-to-back packets. That's assuming that by the time the buffers are filled, 20% of packets sent have already been forwarded.

Figure 3 shows congestion test results typical of most switches that employ such passive approaches in dealing with congestion. For these switches, the maximum number of packets that can be forwarded over a port may be limited by either the maximum number of packet locations in the buffer or by the buffer capacity in bytes.

For small packets, the number of packet storage locations is often the limiting factor. For larger packets, buffer size becomes the bigger problem. One design variant is to dedicate 1,518 bytes of capacity to each buffer location, allowing packets of any size to be stored in each location. This approach makes the maximum number of back-to-back packets a switch can buffer essentially independent of packet size.

The actual congestion test results for switches that employ passive congestion tolerance schemes is shown in Figure 4. Buffer capacities of 40 to 50 packets are probably satisfactory for lightly loaded workgroup networks or when there are few shared resources located on 10M bit/sec ports. But you will need to pay more attention to configuration and traffic patterns if you go with buffers of this size.

A switch that can handle 100 to 300 packets in the 64- to 1,518-byte range is better suited to deal with the less predict-

HOW WE DID IT

Strategic Networks Consulting, Inc. approaches all vendors with products in each switch category to participate in its tests. Participating vendors are charged a fee, so the vendors that agree to submit products are those that deem the tests and inclusion in resulting reports to be worth the fee. Once the tests are complete, vendors may refuse to authorize the publication of results – an important consideration to keep in mind as you examine switch test results.

In evaluating these switches, we used test suites developed by Scott Bradner at the Harvard University Network Device Test Lab. Alantec PowerBits testers were used to measure forwarding rates, throughput, packet loss rate (PLR) and congestion performance. NetCom SmartBits testers were used for the latency measurements.

All testing of 10/10, 10/100 and 10/ATM switches is performed exclusively through Ethernet ports. This means that performance over the high-speed port is measured in a setup with two switches connected via the high-speed port with testers connected to the Ethernet ports.

Forwarding rate, throughput and PLR are measured for packet sizes ranging from 64 to 1,618 bytes and in various traffic loads, all in 30-second trials. The setup has the capacity to test switches with as many as 60 Ethernet ports. In each test, traffic from an input port is "meshed" or distributed over all the output ports, so that it doesn't converge on or congest any output ports.

By comparison, congestion tests overload a single 10M bit/sec output port with multiple input streams. For switches without congestion control, a back-to-back packet-counting test suite is used. For congestion control switches, variants of the standard forwarding/PLR test suites are used. Tests are repeated for the range of packet sizes.

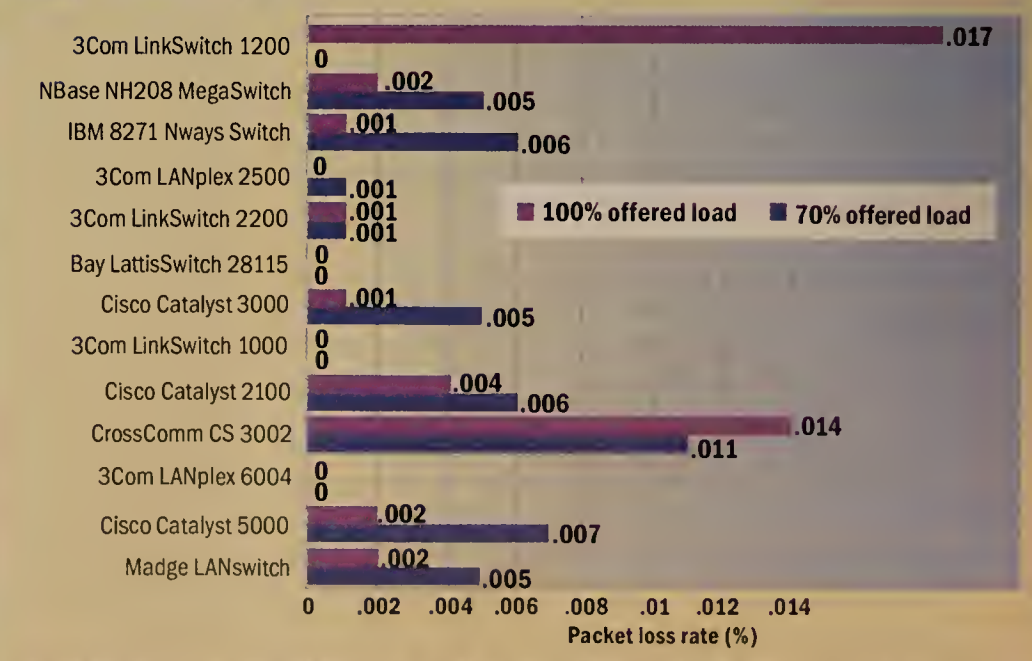
An expanded explanation of our test methodology is available via Network World Fusion (http://www.nwfusion.com). Select NetRef, Technology Resources then Internetworking.

http://www.nwfusion.com

Latency is measured for the standard range of packet sizes in a single stream at 100 packet/sec. The test uses a light load in order to measure the inherent switching engine latency, rather than delays attributed partly to time spent in buffers.

For store-and-forward switches, latency is measured as last bit in to first bit out (LIFO). For cut-through Ethernet-to-Ethernet switching, latency is measured as first bit in to first bit out. These different techniques are consistent with the definition of switch latency as the delay associated with the processing of the packet, not the delay in forwarding it. Latency over the high-speed port is measured as a LIFO latency because the change in speed dictates that at least the Ethernet high-speed switching is store-and-forward.

FIGURE 2: BIDIRECTIONAL PACKET LOSS



Packet loss in 10/100 switches using three 10M bit/sec streams of 64-byte packets. Packet loss of less than .05% is negligible. (See Network World Fusion for 10/10 and 10/ATM switch results.)

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able traffic typical of congested departmental and collapsed backbone scenarios. This level of buffering also provides more leeway in nets using windowed protocols such as TCP, Network File System and Burst Mode NetWare.

With such protocols, bursts of 40 to 64 packets are possible, especially for file-transfer and file-access applications. Maximizing performance for these applications requires that the switch be able to handle such bursts, even if a few converge simultaneously on a single port.

Another benefit of back-to-back packet capacities in the 100 to 300 range is that it seems to ensure that packet loss in the Ethernet-to-Ethernet bidirectional test will stay in the negligible range.

A number of switches have buffer architectures that can accommodate large numbers — from 1,200 to 4,000 — of back-to-back, 64-byte packets. But there's no practical advantage in buffering this many small packets, so it makes sense to focus attention on the results for large packets used by most applications that generate back-to-back packets.

Keeping the pressure off

An alternative to using buffering to prevent packet loss is to stop packets at the source when congestion arises. Switches with such active congestion control features do this by applying back pressure on incoming data, typically by spoofing collisions or sending busy carrier signals.

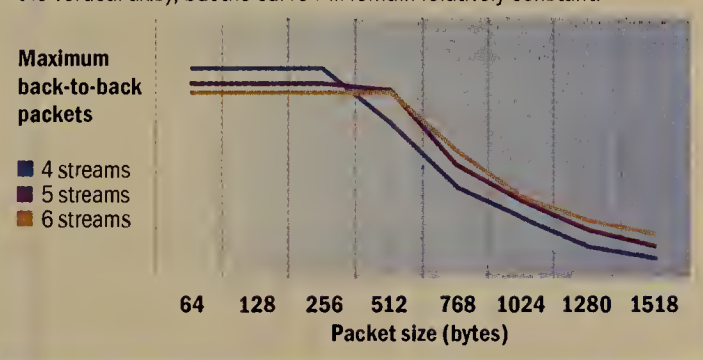
Therefore, the tests for these switches focus on the ability to throttle back input traffic to balance the capacity of the output port without allowing packets to be lost. This is determined by measuring the forwarding rate and PLR for the five throttled input streams. A switch performing perfectly in this test would have a PLR of 0, while fully saturating the single output stream with wire-speed traffic.

The Madge Networks, Inc. LANswitch (acquired by Madge when it bought LANNET, Inc.), ONET Data Communications Technologies LANbooster and 3Com LinkSwitch 1000 switches come very close to perfection — generally registering packet loss on the order of 0% to 0.5%. And that loss is only because the back-pressure mechanisms delay the packet arrival beyond the tester's measurement window.

The NBase Switch Communications NH208 MegaSwitch congestion control scheme allows the tester to forward 173% to 184% of the theoretical capacity of the output port, with resulting packet loss of around 40%. The NBase switch applies back pressure on a per-packet basis, causing collisions only for those packets destined for a congested output port. Destination addresses are decoded by a fast table lookup that verifies availability of buffer space at the output port as the packet is still being received. If the output port buffers are nearly full and multiple packets arrive simultaneously destined for the congested port, they will all be accepted by the switch, sometimes overflowing the last available buffer location.

FIGURE 3: THE CONGESTION CURVE

The chart depicts how, for switches without active congestion control features, the number of packets that can be forwarded over a single port changes with packet size. Switch buffer size varies (hence no values on the vertical axis), but the curve will remain relatively constant.



NBase contends that if the test datastreams were unsynchronized and based on a more realistic mixture of traffic destined for both congested and noncongested ports, the MegaSwitch congestion mechanism would compare more favorably. While this is likely to be true, adjusting the back-pressure mechanism to kick in at a lower threshold would appear to be a simple way to improve test results and safeguard the switch from packet loss in real networks.

Don't keep me waiting

While congestion can certainly lead to lost packets and poor response time, some delay is also due to switch latency, which is defined as the time it takes for a switch to process a single packet.

A wire-speed switch obviously has to process a packet in less time than it takes for the next one to arrive, so throughput and latency are not completely independent metrics. As long as latency at high load is low enough to allow wire-speed throughput, a few microseconds either way doesn't usually matter much in terms of performance.

In our tests, we make sure to measure only the inherent processing latency of the switch by keeping the load at a very light 100 packet/sec. At that load, the latency results are best used to gauge the effectiveness of the switch architecture. Low, relatively constant latency — regardless of packet type, packet size or the combination of ports servicing the conversation — is a good indication of an efficient and robust switch design.

Because we measure at light loads, our latency results are only an approximation of switch latency under heavier loads. Performing the measurements under heavier loads wouldn't make the results more realistic, however. In heavily loaded Ethernets, collisions and congested switch ports will often have more impact on network delay than inherent switch latency.

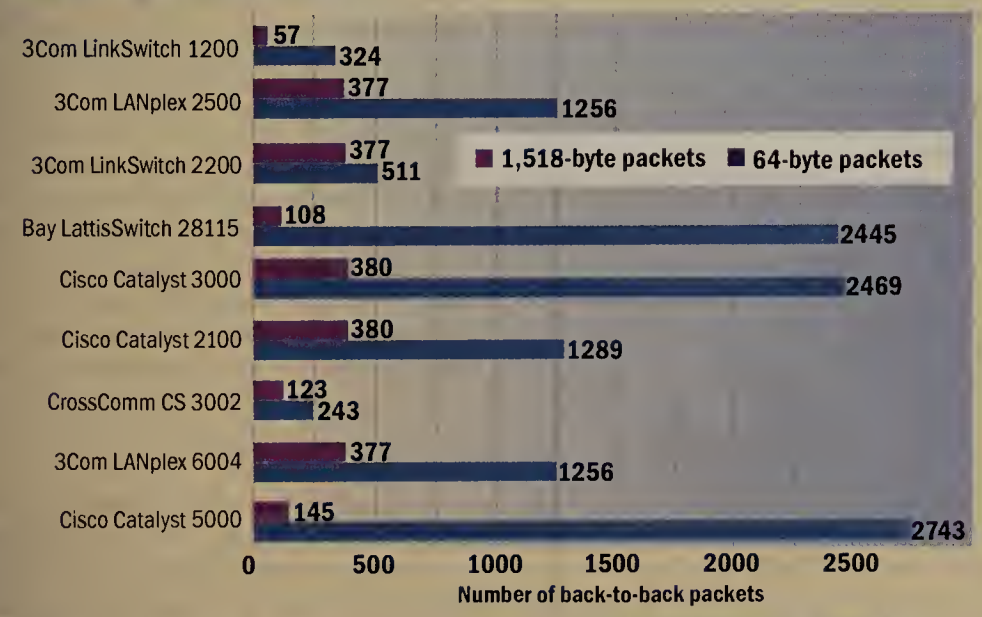
With the exception of some special circumstances involving nonwindowed protocols that require every packet to be acknowledged before the next is sent — such as pre-Burst Mode IPX — the contribution of switch latency to the delay in response time noticed by the end user is likely to be negligible in comparison with system delays caused by interrupts, application queuing and the like.

Where nonwindowed protocols are a given, the latency issue will often come down to one of choosing a cut-through capable switch vs. one that operates only in a store-and-forward mode. Where windowed protocols such as TCP/IP, DECnet and Burst Mode IPX are the rule, the mode of switching is much less important because windowing enables the processing of multiple in-flight packets to overlap, masking much of the delay encountered by individual packets.

As the switches become deployed more widely in enterprise networks, shared resources are increasingly being assigned to high-speed ports rather than Ethernet ports. Therefore, it makes sense to focus attention on Ethernet-to-Ethernet latency via the high-speed port. This also provides some insight into the question of which high-speed technology might be more appropriate as a backbone for interconnecting departmental or workgroup switches.

The important point we learned from our tests is that for switching over the high-speed port and back again, cut-

FIGURE 4: CONGESTION TOLERANCE



Maximum number of back-to-back packets transmitted by 10/100 switches without loss, using five Ethernet streams converging on one 10M bit/sec output port.
(See Network World Fusion for 10/10 and 10/ATM switch results.)

PICKING A WINNER

No one switch comes out on top in all the categories you need to consider, so the best approach in selecting a switch is to define your requirements in terms of price per port and functionality.

Important considerations include: port count, support for your site's choice of high-speed LAN, fault tolerance, management options, and cut-through vs. store-and-forward. This will typically narrow the field down to a handful of switches. Then you can use performance benchmarks to home in on two or three finalists.

If you are making a major buy or there are mission-critical applications on your net, it makes sense to test-drive your final selections before signing a purchase order.

When it comes to performance, here's what to look for in 10M/100M bit/sec and 10/ATM switches:

Filter A: Good congestion test scores. For switches without active congestion control, the ability to handle 100 to 300 back-to-back 64- and 1,518-byte packets pretty much assures negligible packet loss no matter what the traffic pattern. Switches that can buffer more than 100 1,518-byte packets deserve extra points for robustness.

Filter B: Negligible packet loss in the bidirectional packet loss rate (PLR) tests. Two-way PLR at less than .05% or so confirms that the buffering scheme also works well in a real-world scenario, where there are collisions and congestion on switched Ethernet segments.

Filter C: Good throughput over the high-speed port. If the switch has the port density to saturate the high-speed port, the switch forwarding engine should be able to take advantage of it with throughput at or approaching wire speed. It's a challenge for today's switches to saturate full-duplex, high-speed ports, so this is an area where some trade-offs in functionality vs. price make sense.

Filter D: Consistently good latency and latency variation results. In most applications, switch latency isn't a problem. But low, relatively constant latency is a good indication of an efficient and robust switch architecture. It also is a sign of a switch that is capable of predictable performance for whatever latency-sensitive application the future might hold. Again, this is an area where some trade-offs can be made.

Filter E: In the event that a number of switches are still tied at this point in your comparison, the old standbys of best throughput in Ethernet-to-Ethernet switching or lowest latency in 10/10 or various 10/100 or 10/ATM tests serve as the final arbiters.

— Rolf McClellan

through switching offers a relatively small advantage over Ethernet-to-Ethernet switching. This is because of the faster transmission time over the high-speed LAN and because cut-through switches are forced to revert to store-and-forward mode before shipping Ethernet packets off to the high-speed LAN.

The cut-through switches we tested are the Cisco Catalyst 3000, 3Com LinkSwitch 1000, IBM 8271 Nways Ethernet LAN Switch and Cisco Catalyst 2100, which takes, by far, the greatest advantage of its cut-through mode.

Most of the Ethernet/fast Ethernet switches tested had very low latency variation — less than 8 microsec — for unicast and broadcast packets. Two of the higher performance switches, the Bay Networks, Inc. LattisSwitch 28115 and CrossComm CS3002, had minuscule latency variation of 0.3 microsec. Bay does well here in part because it uses a proprietary, 200M bit/sec version of fast Ethernet when connecting two fast Ethernet ports to each other.

With the exception of the 3Com LinkSwitch 1200, 10/FDDI switches and 10/ATM switches exhibited somewhat higher latency variation than the Ethernet/fast Ethernet switches.

But most of the variation was well below the 200 microsec level at which jitter might begin to be noticeable in a multimedia application. Much greater delay variation can result from collisions or queuing due to congestion, which is the rationale for the traffic priority schemes implemented in Madge's LANswitch and the Catalyst 5000. 3Com plans to add its priority access control for Ethernet technology to the next generation of its switch silicon.

One-way stress test

We also tested the basic ability of the switches to process multiple parallel streams of back-to-back Ethernet traffic without packet loss. Most of the switches tested are capable of full wire-speed throughput for the maximum number of unidirectional Ethernet-to-Ethernet streams supported by the switch's tested configuration.

The exceptions are some modular switches, which can be configured with enough Ethernet ports to exceed the bandwidth capacity of the shared backplane or frame-forwarding engine. For these switches, the throughput at maximum stream counts typically would fall in the range of 60% to 90% of the theoretical maximum.

High port density modular switches often are used for enterprise applications, such as departmental or backbone switches. In these cases, raw performance may be traded off against support for multiple LAN technologies, flexible, user-configurable media access control (MAC) layer packet filtering or full network layer routing for popular LAN protocols.

For products in this category, throughputs of 60% to 90% for high stream counts are pretty good because this represents a sizable improvement in price/performance over most conventional routers used as collapsed backbones today.

Products in our tests that support multiprotocol routing include Cabletron Systems, Inc.'s ATX, Xylan Corp.'s Omniswitch-5 and Bytex Corp.'s ELS. All of these products feature Reduced Instruction Set Computing-based switch architectures in order to cope with the software complexity and evolving nature of multiprotocol routing.

On the other hand, switches optimized as MAC layer bridges, or as bridges with limited IP routing capability, are frequently designed with Application Specific Integrated Circuit (ASIC) architectures in order to maximize throughput and minimize cost per port.

Only two switches, the Madge LANswitch and Cisco Catalyst 5000, were capable of 100% throughput for the maximum number of streams the test equipment can support (30 Ethernet streams requiring 60 switch ports). Both are ASIC based, and neither switch supports routing.

McClellan is a senior consultant and director of the testing program at Strategic Networks Consulting, a Rockland, Mass.-based consultancy specializing in helping end users evaluate network architecture alternatives. He can be reached via the Internet at mcclellan@snci.com.

Xylan regrets that it is not a billion-dollar company. By way of apology, we would like to offer the following:

Every Major LAN Type

1 Ethernet: 10BaseT, 10Base2, 10Base5, 10BaseFL
2 Token Ring: UTP, STP, Fiber
3 FDDI: Multimode, Single Mode, UTP (CDDI), DAS, SAS
4 100BaseT: 100BaseTX
5 ATM: OC-3 Multimode, OC-3 Single Mode, OC-3 UTP, STM-1, DS-3

Broad Choice of Switching and Routing Options

6 Transparent Bridging (802.1d Spanning Tree)
7 Source Route Bridging
8 Source Route / Transparent Bridging (SRT)
9 Virtual Rings
10 Optimized Device Switching
11 Broadcast and Multicast Flood Limiting
12 IP Routing
13 IPX Routing
14 Automatic MAC-Layer Translation
15 Very Low Latency
16 LAN Encapsulation (RFC 1483)
17 IP Over ATM (RFC 1577)
18 ATM Forum LAN Emulation Client (LANE 1.0)
19 Optimized LAN Emulation
20 Optimized Trunking Protocol

AutoTracker – Policy-Based Virtual LANs

21 Policies Defined in NMS
22 Port Group Policies
23 MAC-Layer Address Policies
24 Protocol Type Policies
25 Network-Layer Address Policies
26 User-Defined Policies

OmniVision – Creative Network Management

27 Switch Manager
28 AutoTracker Manager
29 HP OpenView for Windows
30 HP OpenView for UNIX
31 SunSoft SunNet Manager
32 IBM NetView for AIX
33 ASCII Console
34 Network-Downloadable Software and Configuration
35 RMON

Powerful Hardware Architecture

36 Nine-Slot Modular OmniSwitch
37 Five-Slot Modular OmniSwitch
38 12-Port PizzaSwitch with Modular High-Speed I/O
39 Same Hardware and Software Technology Across All Platforms
40 Wire-Speed Switching
41 Distributed Switching Architecture; Frames Moved Once Across Bus
42 Two RISC Processors and Five ASICs per Switching Module
43 Global Safety and Emissions Listings
44 Wall-Mount and Rack-Mount Options

Comprehensive ATM Switching (Q3 1996)

45 Switches Ethernet + Token Ring + FDDI + 100BaseT + 25M ATM + OC-3 ATM + OC-12 ATM
46 Distributed Switching Architecture; No Single Point of Failure
47 Efficient 13.2 Gbps Fabric
48 Dynamic Input Buffering with Output Control; Optimized for ABR + VBR + CBR + UBR
49 High Port Density
50 Low Cost per Port
51 High-Performance Multicast
52 Full Support for ATM Forum Standards

Extensive Failure Resistance

53 Redundant Management Processor Module
54 Load-Sharing, Hot-Swappable Power Supplies with Dual AC Inputs
55 Passive Backplane
56 Flash for Configuration and Software Storage
57 Dual Cooling Fans

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SPECIAL LAN SWITCHING SECTION

A SWITCH FOR ALL REASONS

Choosing the switch that will help fix what ails your net.

By Rolf McClellan

Given that choosing a switch depends on the problem you're trying to solve, we've come up with a number of typical scenarios, each with different implications for the switch functionality, features and performance you'll need.

In each of the general categories — workgroup, department and backbone — we examine some of the bandwidth problems and explain how switching can help you solve them. A short checklist with some of the desirable features and characteristics is provided to help guide the switch selection process.

The emphasis here is on 10M/100M bit/sec switching, but most of the points carry over to 10/10 or 10/ATM switching.

Another point to bear in mind: If your plans call for using switching across all these scenarios, you may want to maximize overall net functionality and minimize the complexity of net management and operations by limiting the number of switch vendors and models you use. This requires more of an architectural approach to the selection process.



The workgroup workhorse

A common problem at the workgroup level is when a shared-media Ethernet LAN becomes congested with traffic flowing between desktops and a local server, or between the server and the site backbone.

One potential solution is to microsegment the net by adding more Ethernet adapters to the server along with small hubs, each supporting a handful of clients. Dividing the existing client connections among these additional segments increases the bandwidth available to each client desktop.

Although straightforward, this approach has the disadvantages of burdening the server with additional route computation and of introducing PC-based router latency among segments as well as to the backbone. This can hamper performance for nonwindowed protocols that require acknowledgements for each packet, such as pre-Burst Mode IPX.

A better approach is to replace the shared-media hub with a LAN switch that expands the bandwidth of the LAN by several times, while segregating peer-to-peer from client/server traffic.

In this scenario, a 10M bit/sec Ethernet switch would be appropriate only as long as demand on the server and/or server throughput are low enough to preclude any significant benefit from higher speed server connections.

Keep in mind that with high-performance servers, a 10M bit/sec server port would often act as a performance bottleneck when multiple client systems are simultaneously contending for access. In these cases, upgrading the server port to 100M bit/sec can have significant benefit.

If the switch also provides the backbone connection for the workgroup, a 10M bit/sec backbone connection may not be enough to deal with all the clients needing access to centralized servers, print facilities or Internet access gateways.

You'll know you need more bandwidth if you see escalating utilization, collisions and user response time when monitoring with net analyzers or Remote Monitoring tools. Under these circumstances, upgrading the switch backbone and backbone access ports to 100M bit/sec can yield performance improvements.

You may find jumping from a shared-media network to private or dedicated Ethernet ports for individual desktops to be a rather drastic change to make in a single step. Perhaps you prefer a migration path that allows you to add bandwidth more gradually, to keep just ahead of demand and user population growth.

In this case, the LAN switch can be used to connect a mixture of shared and dedicated LAN segments. As demand increases, bandwidth can be scaled gracefully by decreasing the number of users per hub and dedicating more switch ports to individual desktops.

This scaling necessitates the deployment of more LAN switches, possibly leading to the point where shared-media hubs are eliminated from some parts of the net.

For smaller workgroups that are not expected to increase significantly in size, fixed-configuration or expandable switches are generally most appropriate since they provide the lowest entry prices and the lowest price per port.

Because price per port is so important, some workgroup switch vendors have cut costs by limiting media access control (MAC) address table capacity to only a few addresses per port or by adding congestion control features that allow buffer capacity to be reduced.

But a switch can only support the number of endstations for which it has MAC address capacity, and congestion control features can increase delay for traffic that is not destined for the congested port (see story, page 52). Therefore, these cost reduction strategies can reduce the flexibility you have in deploying the switch. You need to take careful account of configuration details and specific traffic conditions.

Another common issue for workgroup switching is whether to choose a switch that supports cut-through or fragment-

TOLERANCE VS. CONTROL

Congestion tolerance or control features are key to preventing the packet loss that is common when Ethernet switch output ports are subject to traffic bursts that temporarily oversubscribe the port by several times, overflowing the capacity of available buffers.

This packet loss requires transport layer recovery schemes to kick in, which takes long enough to have a noticeable effect on user response time. Retransmitted packets also have a tendency to exacerbate the congestion problem by adding to the network traffic load.

Active congestion control schemes that apply back pressure on a per-port basis — such as those implemented on the Madge Networks, Inc. LANswitch, ONET Data Communications Technologies LANbooster and 3Com Corp. LinkSwitch 1000 — will eliminate packet loss by delaying all traffic on the throttled segment, regardless of whether it is destined for the congested output port.

This means data destined to remain on the throttled segment as well as traffic destined for noncongested switch ports is effectively blocked by the congested port.

An alternative congestion control scheme — used by NBase Switch Communications' NH208 MegaSwitch, for example — aims to eliminate these additional delays by applying back pressure on a per-packet basis rather than on a per-segment basis.

The choice between active congestion control and passive congestion tolerance may often come down to a trade-off between avoiding packet loss altogether vs. minimizing the average network response time.

Active congestion control provides a large reduction in response time for the few users who would be affected by packet loss, possibly at the expense of increasing response time for a larger subset of the network population.

Applied on a per-segment basis, congestion control may be best suited to those applications where each 10M bit/sec port is dedicated to an individual desktop or to environments where most of the traffic is directed to and from a server connected to the switch via the high-speed port.

On the other hand, a switch without congestion control but with enough buffer capacity to eliminate packet loss under all practical circumstances has the advantage that it can be deployed throughout the network with less regard for specific traffic patterns and client/server system configurations.

— Rolf McClellan

free Ethernet switching vs. one that uses store-and-forward mode for all traffic. Cut-through switches can significantly reduce response time for applications that use nonwindowed protocols. But there are trade-offs, because cut-through's advantage is fully realized only in those configurations where there is little congestion of switch ports.

Scaling up

A variation of the workgroup scenario involves the requirement to be able to scale up the number of dedicated switched Ethernet ports to between 24 and 100. This larger number of client systems makes fixed-configuration and stackable switches less appropriate. To scale up, a number of the high-bandwidth ports on these switches must be used for switch-to-switch connections, leaving few, if any, available for server or backbone connections.

Chassis-based modular switching hubs or stackable switches that use a stackplane architecture, whereby multiple units are connected via a private switch-to-switch interconnection, generally have more than adequate backplane bandwidth for this type of scenario. Modularity also provides the flexibility to balance the number of Ethernet and high-speed ports to match the requirements of individual workgroups.

Considering the large number of users and servers connected, modular switching solutions need to be more robust than fixed-configuration switches in terms of overall performance, congestion test scores, fault tolerance and management functionality. Naturally, these features are reflected in a higher price per port as compared to fixed-configuration or less expandable switches.

Figure 1 provides general guidelines on what characteristics to look for in a workgroup switch. We also included some examples of the switches in each category that performed well in our tests and seem appropriate for these applications.

Our selection of Cisco Systems, Inc.'s Catalyst 2100 and 3Com Corp.'s LinkSwitch 1000 was largely influenced by price per port, while the choice of Madge Networks, Inc.'s LANswitch and Cisco's Catalyst 3000 stemmed from their scalability and functionality, as well as cost.



Departmental decision

At the departmental level, LAN switches can play a number of roles, including segmenting the LANs supported by a single departmental hub, improving access to backbones and centralized servers, and interconnecting shared- and switched-media workgroups. In each role, the switches can relieve the bottlenecks that may be choking your net.

One common type of bottleneck occurs when the workgroups supported by a single data closet hub begin to generate more traffic than one or two Ethernet segments can handle.

Using multiple two-port bridges to segment traffic is an expensive and cumbersome solution. Multiport bridges or bridge/routers also are alternatives, but they typically have performance characteristics and per-port pricing that make them inappropriate for data closets.

Ethernet switches, on the other hand, can easily provide the right price/performance for segmentation at this level of the network.

Likewise, switches also can play a role in improving access to centralized data or application servers that may be on a different floor from the end users that need access to them.

Often, a bottleneck occurs when multiple workgroup LANs are connected to a single departmental bridge or bridge/router that supplies a connection to the backbone on which the server sits.

One way to relieve that congestion would be to upgrade the workgroup shared-media LAN to the same speed as the backbone.

However, that can be an expensive proposition involving costly hubs and adapters, plus possible disruption of existing applications.

A dual-speed LAN switch with a high-speed port for connection to the backbone increases bandwidth to remote servers more cost effectively because it does not displace existing investments in desktop adapters or shared-media hubs.

What to look for

For either of these so-called data closet segmentation applications, fixed-configuration switches with a small number of Ethernet and high-speed ports are generally appropriate. Price per port is amortized across all the desktops that will be sharing each segment and is therefore less of a concern than in the workgroup scenarios.

Key criteria are the ability to store many MAC addresses per port and sophisticated bridging implementations that can aggregate traffic from a number of busy shared segments.

Where traffic from several segments may converge on a single Ethernet segment, good congestion tolerance and control is called for. Congestion control that applies back pressure on a port or segment basis is less appropriate for this application than back pressure applied on a per-packet basis.

As a departmental resource, easy integration with the department or site management solution tends to have greater significance.

A switch hierarchy

Departmental networks can also be defined in terms of floorwide interconnection of shared- and switched-media workgroups. As Ethernet switches are deployed at the workgroup level, the demand for bandwidth to departmental resources can escalate dramatically, quickly exceeding the capacity of high-speed shared-media LANs.

A more flexible solution is to deploy another level of switching in a hierarchy that allows bandwidth capacity to be scaled up gracefully.

In that fashion, you can more easily meet demand for interconnection among these workgroups, shared workgroup access to departmental servers and shared access to the site's distributed or collapsed backbone.

With the rapid growth of workgroup switching, the departmental switch will be increasingly challenged to deliver enough high-speed connections to keep up with the expanding aggregate band-

Figure 1. What to look for: workgroup switches

	Small workgroup	Large workgroup
Price per port	Low	Low
Ethernet port count	Fixed (6-24)	Scalable
High-speed port count	1-2 fixed or expansion	Scalable
Packaging	Fixed configuration	Stackable or chassis
MAC addresses per port	Low (1-100)	Low (1-100)
Internetworking	Simple bridging	802.1d for redundant links
Fault tolerance	None	• Hot swappability • Redundant power option
Network management	Configuration mgmt., status monitoring	Configuration mgmt., status monitoring
Value-added features	RMON per port	"Stackplane" for stackable hubs, RMON per port, traffic priority, VLANs
Key metrics	• Entry price • Price/performance	• Aggregate performance • Congestion results
Leading performers	• Cisco Catalyst 2100 • 3Com LinkSwitch 1000 • CrossComm ESS 3002	• Madge Networks LANswitch • Cisco Catalyst 3000

Figure 2. What to look for: departmental switches

	Data closet segmentation	Workgroup interconnection
Price per port	Low/moderate	Moderate
Ethernet port count	Fixed (6-16)	Fixed (8-16)
High-speed port count	1-2 fixed or expansion	Expandable (2 or more)
Packaging	Fixed configuration	Expandable
MAC addresses per port	Medium (300 or above)	Medium (300 or above)
Internetworking	• Full bridging • Broadcast filtering • Packet filtering • 802.1d • Translational bridging and IP fragmentation for FDDI	• Full bridging • Broadcast filtering • Packet filtering • 802.1d • Translational bridging and IP fragmentation for FDDI
Fault tolerance	None	Redundant power option
Network management	• Configuration mgmt., status monitoring • Compatible with site management platform	• Configuration mgmt., status monitoring • Compatible with site management platform
Value-added features	RMON per port	RMON per port, traffic priority, VLANs, limited routing features
Key metrics	• Entry price • Price/performance • Congestion tolerance	• Aggregate performance • Congestion tolerance
Leading performers	NBase MegaSwitch	• 3Com LANplex 2500 • Bay Networks 28115

width to the desktop.

This means that while fixed-configuration switches with one or two high-speed ports may be adequate today, greater densities will be required in the future, placing a premium on switches with expandable capacity for high-speed ports. Large departments with pervasive workgroup switching may already be at the point where modular switches should be considered.

Compared to switches for data closet segmentation, the critical nature of departmental server and site backbone connectivity argues for some degree of fault tolerance or switch redundancy, and increased robustness of traffic management.

This includes protecting the backbone from unwanted or disruptive traffic with more sophisticated packet-filtering capabilities.



Figure 2 summarizes some general guidelines on what switch characteristics to look for, with examples of the switches that seem to have the right performance and functionality for each application.

NBase Switch Communications' NH208 MegaSwitch was selected as matching the overall description well, with a reasonable entry price for six Ethernet segments. The choice of 3Com Corp.'s LANplex 2500 took into account its expandability, media flexibility and packet-filtering functionality.

Bay Networks, Inc.'s LattisSwitch can operate as a 10M/100M bit/sec switch with 16 Ethernet ports and two fast Ethernet ports. It can also function as a 100/100 switch with 18 Ethernet ports, providing the ultimate in bandwidth expandability in a fixed-port configuration.

Breaking room on the backbone

In most organizations, the performance crisis is most pressing in the site or campus backbone, where more and more traffic from feeder LANs aggregates. This is especially true as distributed computing becomes less localized, with clients requesting access to servers throughout the building or campus.

Collapsed backbone routers and distributed high-speed shared-media LANs have been used successfully in the past to effectively expand the bandwidth of the site backbone. But in many instances, the bandwidth demands of the highly segmented feeder networks have exceeded the limits posed by shared backplane capacity of bridge/router and the speed of shared LAN media.

A LAN switch can provide bandwidth relief as a direct replacement of a bridge/router used to support a collapsed backbone, as long as the full packet-filtering and policy implementation capabilities of routing are not required.

Switches intended for use in collapsed backbone applications typically support a number of advanced bridging features that allow you to set parameters for filtering traffic and limiting broadcast forwarding.

In addition, some switches may integrate optional routing functionality within their packet forwarding architectures.

As is generally the case with conventional bridge/routers, trade-offs are to be expected between performance and functionality as routing features of the switch are enabled.

Another way to blend the performance of switching with the robustness of routing is to implement virtual LANs within the switched internetwork, using outboard routers to provide the packet forwarding and administrative boundaries among VLANs.

In a similar fashion, a distributed Ethernet or FDDI backbone can be replaced by a collapsed backbone implemented with a LAN switch.

In this case, the basic routed structure of the network can be preserved by keeping in place the access routers typically located on each floor. If these routers prove to be a performance bottleneck, they can be replaced by routing functionality within the switch or by configuring VLANs with outboard routing as described above.

Deploying switching to upgrade either a distributed backbone or a bridge/router collapsed backbone has the advantage of preserving most of the investment in the LAN infrastructure of the floor networks.

Most of the server connections, shared media hubs, and switches in the floor networks or in the central computer room are not disrupted.

Equipment that is displaced can generally be redeployed in different roles or at other sites in the network. For example, displaced collapsed backbone routers can often be recycled for wide-area connectivity or as route servers in a VLAN environment.

What to look for

When looking for a site backbone switch, keep in mind they generally need to be more robust and flexible than workgroup or departmental switches. As site or departmental collapsed backbone networks scale up to accommodate larger numbers of shared and dedicated segments, the importance of high-speed server connections and backbone ports, Layer 3 routing, modular packaging, network management features and fault tolerance increases accordingly.

In other words, for backbone applications you are probably looking for a functionality superset of the other scenarios, and this might be the case when trading off some degree of performance to gain functionality would make the most sense.

Figure 3 summarizes some general guidelines on switch characteristics to look for, with examples of the switches in each category that seem to have the right performance and functionality for each application.

For small-site collapsed backbones, we like 3Com's LANplex 2500 and Bay's LattisSwitch 28115 for the same reasons cited in the departmental rundown, given that the requirements to look for are largely the same.

For larger collapsed backbones, we opted for scalability (up to 96 Ethernet ports or 50 fast Ethernet ports), coupled with functionality in Cisco's Catalyst 5000.

McClellan is a senior consultant and director of the testing program at Strategic Networks Consulting, Inc., a Rockland, Mass.-based consultancy specializing in helping end users evaluate network architecture alternatives. He can be reached via the Internet at mcclellan@snci.com.

Figure 3. What to look for: backbone switches

	Small collapsed backbone	Larger collapsed backbone
Price per port	Moderate	Moderate/high
Ethernet port count	Fixed (6-16)	Scalable (16 and up)
High-speed port count	1-2 fixed or expansion	Scalable (2 or more)
Packaging	Fixed configuration or expandable	Modular
MAC addresses per port	High (1,024 or above)	High (1,024 or above)
Internetworking	• Full bridging • Broadcast filtering • Packet filtering • 802.1d • Translational bridging and IP fragmentation for FDDI • Routing option	• Full bridging • Broadcast filtering • Packet filtering • 802.1d • Translational bridging and IP fragmentation for FDDI • Routing option
Fault tolerance	Redundant power option	• Redundant power • Hot-swappable modules
Network management	• Configuration mgmt., status monitoring • Compatible with site management platform • Integration with router and hub management applications	• Configuration mgmt., status monitoring • Compatible with site management platform • Integration with router and hub management applications
Value-added features	RMON per port, traffic priority, VLANs	RMON per port, traffic priority, VLANs
Key metrics	• Entry price • Price/performance • Congestion tolerance	• Aggregate performance • Congestion tolerance
Leading performers	• 3Com LANplex 2500 • Bay Networks 28115	• Cisco Catalyst 5000

Management Strategies

Covering: Career Insights and Innovations in Managing Staff, Budgets and Technology

Briefs

AllMicro, Inc. *has released* **Certified NetWare Engineer Self-Study Course,** *a computer-based training tool that prepares users for the CNE test.*

The CD-ROM program covers NetWare 3.1X installation, administration, configuration, service and support, migration to NetWare 4.1 and the use of TCP/IP in NetWare. The program asks users to solve simulated network problems and provides tutorials and experiments.

It costs $1,495, and corporate discounts are available.

AllMicro: (800) 653-4933.

Elsewhere on the NetWare training front, **Novell, Inc.** *is offering educators around the country a chance to take part in its* **Novell Education Academic Partner (NEAP)** *program.*

NEAP is designed to help high school and college students learn NetWare and polish the skills needed to land one of the information technology jobs on Money *magazine's top 10 careers list.*

An NEAP-Secondary program enables students in any nonprofit secondary school or high school to prepare for the Certified Novell Administrator test.

Novell: (800) 638-9273.

MicroMedium, Inc. *has released* **Digital Trainer Professional,** *a computer-based training (CBT) programming tool.*

The package is available in a Small Business Edition and a Corporate Edition. Both enable users to convert text-based training tools to CBT and create electronic books that consist of images, audio, video, text and questions. The Corporate Edition adds performance logging, question hyperlinks and a PhotoVault CD that has 2,500 color photos.

The tools run under Microsoft Corp.'s Windows 3.1, Windows 95 or Windows NT 3.51, and require 6M bytes of disk space.

The Small Business Edition costs $279.95, while the Corporate Edition costs $975.95.

MicroMedium: (919) 558-9225.

On-line career advice speeds search for jobs

By Richard Van Doren

On-line services are not only changing the way people search for work, they are improving how they interact with recruiters and career counselors.

Many career counselors have long used forums to post information about developing a career focus, preparing for a job search, overcoming objections raised during job interviews and making a winning impression with potential employers.

Now counselors are providing advice to clients via electronic mail, which can shave weeks or months off the search process.

Thanks to on-line services, career counselors are no longer restricted by time and place. They are providing services to clients anywhere in the world at any time of day. Counselor and client no longer have to meet face-to-face, juggle schedules to set up appointments or worry about getting from one meeting site to the next on time.

Take the case of Rosemary. Surfing around on CompuServe, Inc.'s on-line service, she read some articles I posted on the E-Span Career Management Forum. The articles provided a starting point for her search. She had the right credentials for landing a management position in tax accounting, but she also had limitations. She was over 40, a woman in what many consider a man's profession, could not relocate and needed a job with a good income as soon as possible.

What she needed was a realistic assessment of how to position herself during job interviews so that attention was focused on her strengths rather than shortcomings. She contacted me via E-mail and asked specific questions about how to approach likely employers. This began an active electronic correspondence.

Over the next couple of weeks, she kept me informed of her progress with a particular employer and told me an offer was imminent. She then negotiated the deal using carefully scripted responses to the gambits employers use most frequently and accepted a position as manager of partnership taxation with a local firm. We subsequently discussed how to get started on the right foot with her new employer. All of this was done in a short time. Rosemary began her search Oct. 16, accepted her position in November and started her new job just after the new year.

James Gonyea, in his book *The On-line Job Search Companion,* estimates that an on-line job search can take one-sixth the time spent using traditional methods. While cutting job search time so drastically may seem overly optimistic to achieve in every case, Rosemary has proven the point that pounding the keyboard while surfing on-line services can be more time-efficient than pounding the pavement.

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WHAT 'NET JOB SURFING CAN DO FOR YOU

In addition to enabling job seekers to exchange E-mail with career counselors, on-line services let users:

- Bypass executive recruiters by responding directly to an employer's on-line job posting.
- Post resumes with services that automatically match skills with qualifications required to fill open positions.
- Send specially tailored resumes via E-mail, a faster and more inexpensive proposition than printing and mailing them.
- Send focused cover letters directly to corporate executives, bypassing traditional human resource gatekeepers.
- Quickly obtain detailed information about prospective employers, such as their products and services, financial status and recent press clippings.
- Easily find sample resumes in career forums.

Fusion

You can find a list of job searching sites on Network World Fusion. Visit http://www.nwfusion.com, select Careers and look for the top 25 electronic recruiting sites.

MANAGEMENT DATA ON-LINE

Home worksite

If you are interested in starting a telecommuting program, the Telecommuting, Teleworking, and Alternative Officing site on the World-Wide Web can be a good starting point.

Put together by Gil Gordon Associates, a telecommuting consulting firm in Monmouth Junction, N.J., the site provides a monthly overview of telecommuting news, as well as a ton of information about upcoming telecommuting conferences, publications devoted to the topic and a file that answers frequently asked questions about setting up a telecommuting program.

The site also has an area devoted to the virtual office concept, which enables companies with staffs that are frequently on the go to essentially manage office space like hotel rooms. Workers call in to a reservation center to have space set aside when they must be in the office.

Another area is devoted to providing links to information about using Web-based groupware tools and developing intranets, which use Web resources to establish sites accessible to corporate users only.

Lastly, the site has information about network-centric computing, which enables users to download applets from the Internet to perform a task or launch a network-based applet.

The CIO survey says

Deloitte & Touche LLP's Web site provides a breakdown of the key findings of its Seventh Annual Survey of Chief Information Officers. The survey of 400 CIOs finds that 43% of all respondents' applications are now running in a client/server environment, up from 27% the year before.

Furthermore, 90% of respondents say they will spend more on client/server technology during the next two years.

CIOs frequently cited difficulty in supporting client/server systems and advanced networks as reasons for looking outside their own ranks for needed skills. For instance, 31% of respondents say they are currently outsourcing those functions, while another 24% are evaluating outsourcing.

Calculating reliability and availability

A two-part white paper written by Ronald Brown, an independent communications consultant, helps you figure out how to make sure enterprise network circuits will meet your uptime standards. Found on BRP Publications, Inc.'s Web site, the document attempts to help you understand how failure to make some tricky calculations can often result in not getting the type of reliability and availability you need.

Part one defines reliability and availability and provides sample net configurations. Part two guides you through a few basic, yet key, calculations to improve your chances of getting the reliability and availability you need at an affordable price. The sample network configurations provided in part one can be used when making the calculations in part two.

NetworkWorld Fusion

You can use Network World Fusion as your launching pad to the Web sites mentioned here. Select Careers then Management Data On-line.

http://www.nwfusion.com



Some Achieve by Leaps and Bounds

We Achieve by Leaping Boundaries

At Cisco Systems, making respectable progress isn't good enough. We always go beyond the expected, always in the direction of wide open possibilities. That's how we've managed to leap so many boundaries in the development of hardware, software, and customized networking solutions. Very soon, virtually every industry will rely upon internetworking. That means they will rely upon Cisco. And Cisco will rely upon you in the following positions.

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The following positions are available in **San Jose, CA**; **Irvine, CA**; **Billerica, MA**; and **Research Triangle Park, NC.**
Cisco offers relocation assistance as part of the total benefits package.

ENGINEERING

Software Engineers

Join our team as a Software Developer for a Token Ring project and port adapters like ATM and FDDI. You will also be involved in the development of SRB/STACK and other network modules. Must have 5+ years' experience and a BSCS/EE or equivalent. Working knowledge of switch or router-based software, Token Ring technology and UNIX®/C programming experience are required. Experience in LAN emulation and network management software preferred. Dept. SE/DT

Development Test Engineers

We have an immediate opening for a Development Engineer with a BSCS/EE and 3+ years' experience. Develop and execute test plans, test scripts and test suites to verify proper operation of new network interface products. You will work with test configurations designed to focus on functionality, stress test, interoperability and performance. UNIX/C programming skills and experience testing network equipment are necessary. Dept. DTE/DT

Hardware Engineers

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For **San Jose, CA** positions, please send your resume, indicating Dept. of interest, to: Cisco Systems, Inc., Human Resources, P.O. Box 640730, San Jose, CA 95164-0730. FAX (800) 818-9202.

For **Irvine, CA** positions, please send your resume, indicating Dept. of interest, to: Cisco Systems, Inc., Human Resources, Access Business Unit, 2569 McCabe Way, Irvine, CA 92714. FAX (800) 818-9202.

For **Billerica, MA** positions, please send your resume, indicating Dept. of interest, to: Cisco Systems, Inc., Human Resources, 1100 Technology Park Drive, Billerica, MA 01821. FAX (800) 818-9202.

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Perform network installation, testing and documentation for WANs using routed connections to partner networks and the Internet. Provide physical space/power planning; coordinate carrier provisioning; troubleshoot and maintain project schedules/development of router interface and software tables from engineering plans. Requires 7+ years network experience including TCP/IP, Frame relay, T-carrier transmission, OSPF and BGP4 routing protocols. We prefer proven skills in router, terminal server, CSU/DSU and physical interface standards; routing protocols with isolations; transmission rectification; and acceptance testing from physical through network layers on projects prior to production release.

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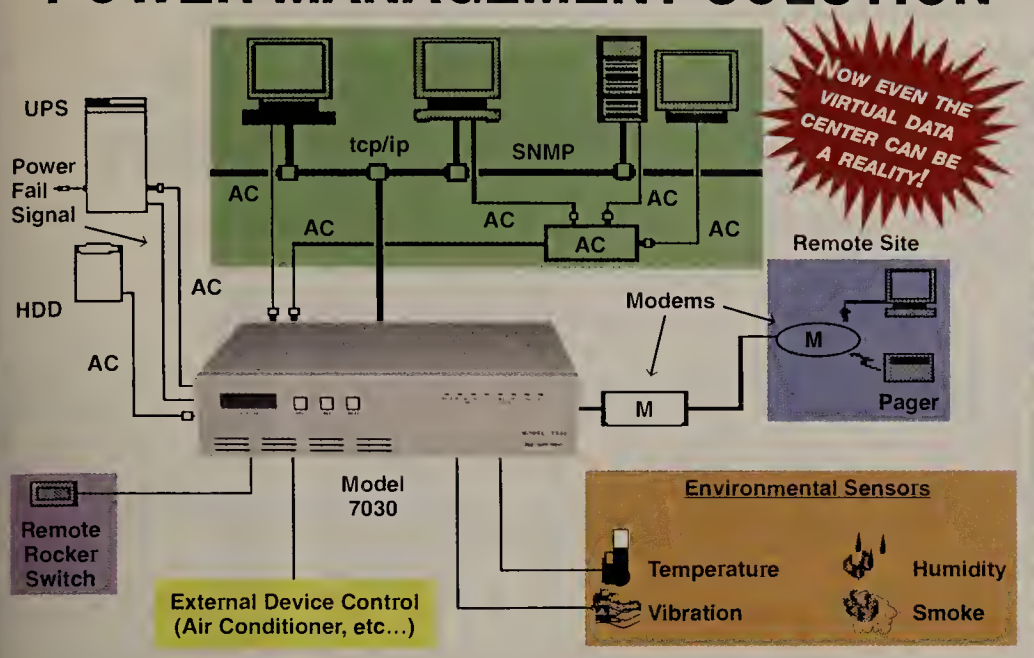
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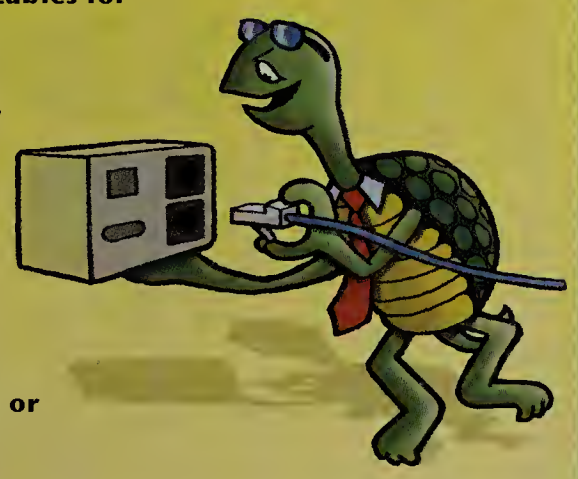
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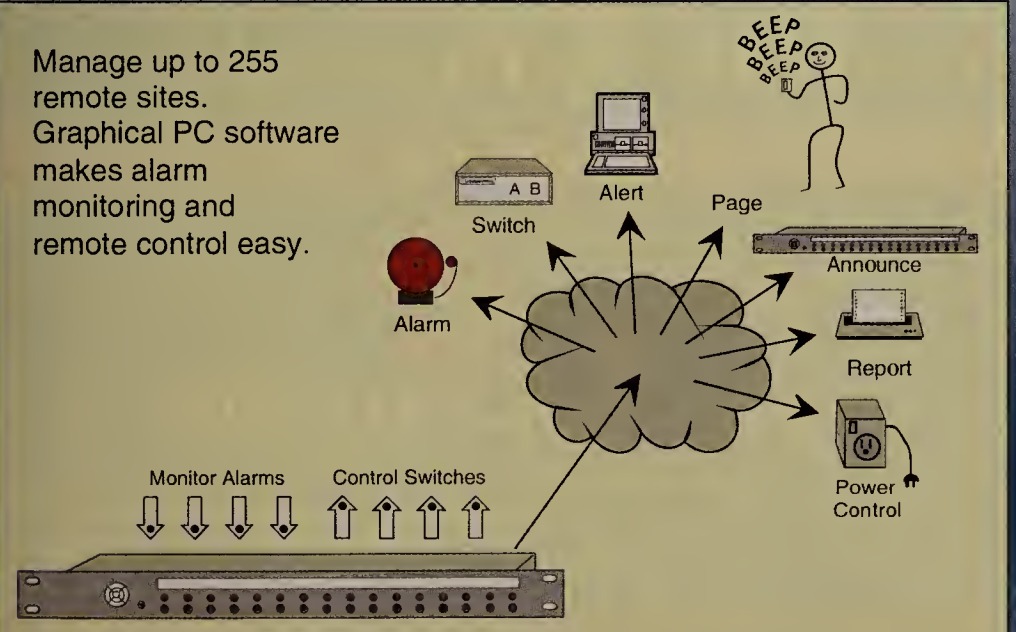
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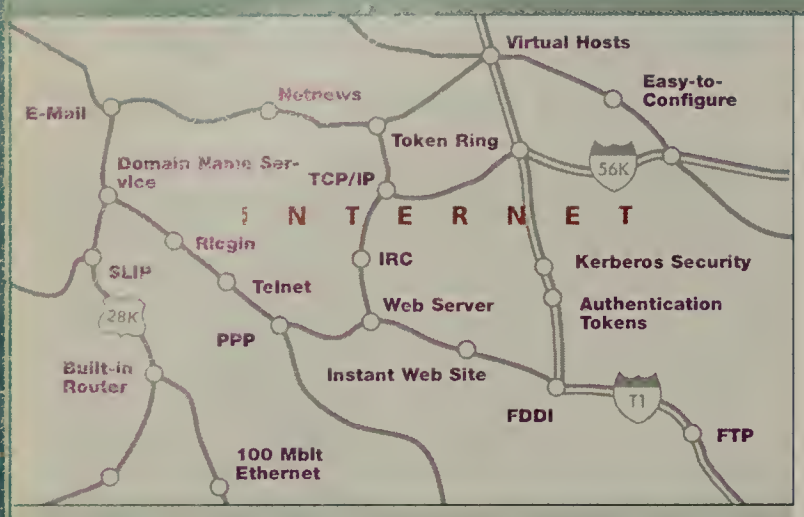
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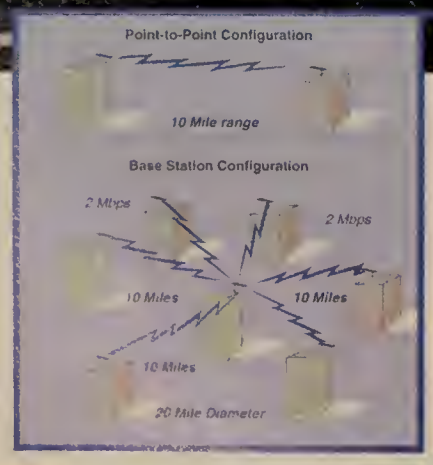
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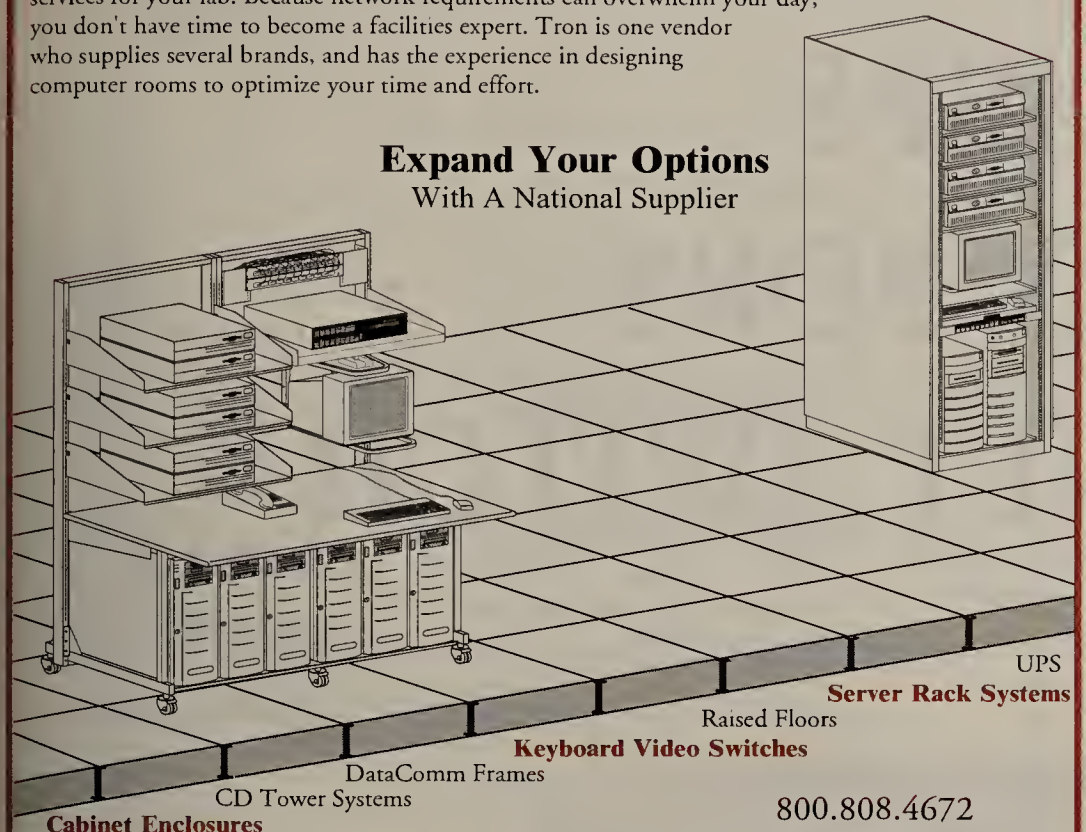
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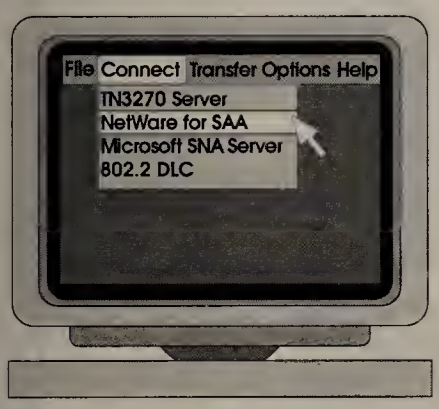
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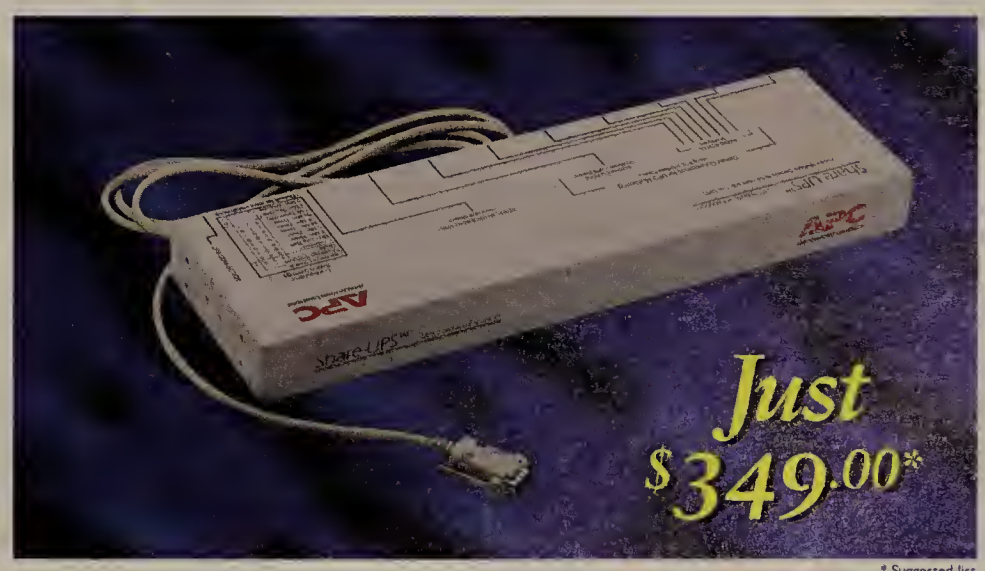
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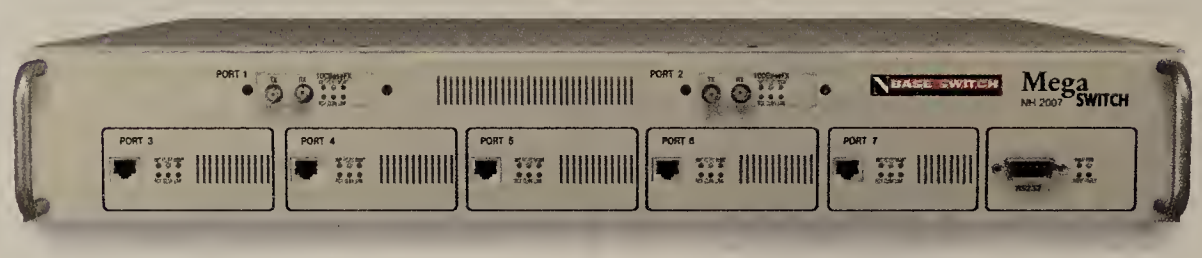
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OLE

Continued from page 1

blown network management package.

Microsoft envisions a world where its OLE-based software gathers highly granular management information from a wide variety of devices, translates it all into a common format and stores it in a central repository. Management software could then simply tap the management server for information.

The system, however, is based on Cairo, the next major version of NT Server, so customers will have to wait until at least 1997 for the new framework.

Under a plan dubbed OLE Management Services (MS), Microsoft would produce an NT Server-based management repository along with a series of generic OLE MS objects that vendors could then customize.

These OLE MS objects would communicate events to the repository, which would then make that data available to OLE-enabled management applications, Microsoft officials confirmed.

Microsoft also will produce conversion utilities that would link data from devices running standard net management protocols, including Simple Network Management Protocol, Common Management Information Protocol/Common Management Information Services and the Desktop Management Task Force's Desktop Management Interface.

That would give OLE-enabled management applications the ability to remotely track performance on everything from high-end telecommunications devices right down to the video card on a particular PC.

"OLE can be used to finally start to provide the level of data integration that the SNMP platform vendors have failed to deliver," said John McConnell, president of McConnell Consulting, Inc. in Boulder, Colo.

The Cairo directory, which is based on OLE Directory Services (DS), will be the object request broker that links OLE MS objects with a central repository, according to Phil Holden, product manager for Microsoft's SMS.

"We're basically extending OLE DS into the management space," he said. "What it does is produce an infrastructure to let you model systems, applications and network information in a consistent, unified way."

Holden expects to ship the first OLE MS development kits in the second half of this year.

Microsoft's next frontier

Microsoft's SMS will support OLE MS, changing it from a systems management application to a network management platform comparable to Hewlett-Packard Co.'s OpenView, Holden said.

Microsoft is offering developers detailed plans on how to OLE-enable their products, sources said.

"They've got a really complete foundation on top of OLE to do network and systems management," said Chuck Townsend, software architect for network management products at Cabletron Systems, Inc. in Durham, N.H.

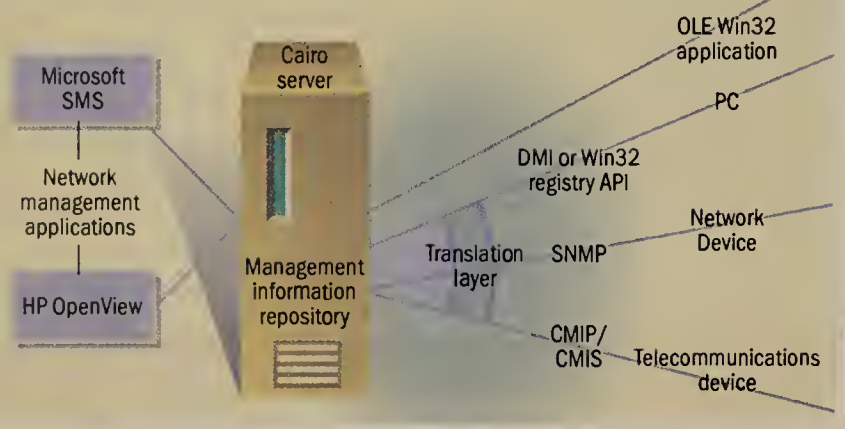
Townsend attended a design review on OLE MS two weeks ago.

Several sources, however, were hesitant about using NT Server-based technology as a standard for heterogeneous net management.

"A few people were concerned that it only runs on NT," one source said. ■

Unified management data is object of OLE MS scheme

OLE MS objects will sit on multiple devices and within applications. They collect information to be stored in a repository based on the directory in the next version of NT Server, code-named Cairo. Microsoft will provide translation from SNMP and other protocols. That data will be available to any OLE-enabled management application.



Ipsilon

Continued from page 1

the efforts of standards groups to meld routing and ATM (*NW*, Feb. 19, page 6).

"There's no focus, no stability in the ATM Forum," said Tom Lyon, Ipsilon's founder, chairman and chief technical officer. Lyon is a 12-year veteran of Sun Microsystems, Inc. and the creator of the ATM Adaptation Layer 5 specification for converting data units to ATM cells.

Ipsilon's management team also includes President and Chief Executive Officer Brian NeSmith, who founded Newbridge Networks, Inc.'s VIVID group; Larry Blair, vice president of marketing, who, as cofounder of Kalpana, Inc., is regarded as the father of Ethernet switching; and officials from Cisco Systems, Inc., Novell, Inc., Network Equipment Technologies, Inc., Advanced Computer Communications and BBN.

Due to a legacy in shared-media connectivity and slow standards development, the largest internetworking vendors — such as Bay Networks, Inc., Cabletron Systems, Inc. and Cisco — are still talking about the promises of IP routing and ATM switching in grandiose "marketectures" such as CiscoFusion, but they are not delivering product, analysts said.

And while most vendors focus on end-to-end ATM, Ipsilon is aiming to bring ATM performance to IP nets. The IP Switch ATM 1600 implements the IP protocol stack on ATM hardware and dynamically determines when to switch and when to route based on the needs of IP conversations, or flows.

For longer flows, such as HyperText Transfer Protocol, File Transfer Protocol, telnet and multimedia applications, IP Switch ATM 1600 performs cut-through switching in the ATM hardware. For shorter conversations, it uses store-and-forward IP routing.

Switch/route methods cobbled together by vendors today usually require users to implement a flat net that is limited in scalability or a hierarchical structure rife with router-hop bottlenecks, users said.

"Each router hop examines the packet, which slows down the performance of sending them along," said Noemi Berry, network development engineer at the National Aeronautics and Space Administration's Ames Research Center in Mountain View, Calif. "But the trouble with switched networks is that they operate at Layer 2 and you lose the scalability, robustness and hierarchical addressing of IP. Now in comes Ipsilon saying you don't have to commit yourself to Layer 3 or Layer 2."

Instead, users commit to using Ipsilon's software, and Ipsilon hardware or other vendors' switching and routing hardware. Ipsilon's software provides call setup, teardown and call status, and flow redirection messages between switches and hosts.

The IP Switch ATM 1600 hardware platform includes an Intel Corp. PCI bus and sports a Pentium Pro processor and a Multimedia Communications, Inc. ATM chipset. In addition, it features 16 155M bit/sec ports, 2.3G bit/sec of nonblocking bandwidth and routing performance of more than five million IP packets per second.

Ipsilon also rolled out the IP Switch Gateway, which connects existing Ethernet, fast Ethernet and FDDI LANs to the IP Switch ATM 1600.

Ipsilon's challenge is to have its technology adopted by the leading internetworking vendors, according to Fred McClimans, principal of Decisys, Inc. in Sterling, Va.

The IP Switch ATM 1600 costs $46,000. It will ship in April.

✆Ipsilon: (415) 846-4600.

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Management team:	Includes officials formerly with ACC, BBN, Cisco, Kalpana, NET/Adaptive, Newbridge, Novell and Sun.
Products:	IP Switch ATM 1600, which supports IP applications over high-speed ATM networks; IP Switch Gateways.

888 numbers

Continued from page 1

Republican senator from Arizona may try to take the decision out of the FCC's hands.

Sen. John McCain might try to slip an auction proviso in a short-term budget measure Congress must deal with by March 15, a spokesman said. McCain also might try to get it in the main federal budget, whenever that is voted on, or file the proposal as stand-alone legislation.

If auctions are mandated by law, the FCC would have no choice but to sell the numbers. Although an FCC order last year stated that auctions might be a good way "to ensure efficient use of number resources," the idea didn't take hold. "At this point, the commission is not pursuing it in any serious way," a staffer said.

The Congressional Budget Office and the Office of Management and the Budget have both queried the FCC about how much cash the numbers might yield, indicating interest from other quarters.

At the rate the 888 numbers are being reserved, the FCC might have to set up yet another toll-free code within five years (NW, Feb. 26, page 10). If this happens, users who want to hang on to their signature numbers would have to pay yet again.

According to attorney Boothby, holders of 800 vanity numbers should get the 888 equivalents, because users will likely forget if a number was prefaced with 800 or 888. In fact, misdialing is common enough that some holders of 800 numbers have acquired frequently misdialed versions of their real numbers as insurance against losing business. Two such "fat-finger numbers" held by American Airlines, Inc. received 60,000 calls over a two-month period last year, Boothby said.

The numbers have a different kind of importance in the financial world, said Ray Messina, an attorney for Dean, Witter, Discover & Co. If a firm didn't hold both numbers, misdialing 888 instead of correctly dialing its 800 number could affect time-critical orders for transactions, costing customers money.

And there is the potential for competitors to buy up 888 equivalents of heavily advertised 800 numbers and siphon off customers who dial the 888 version by mistake.

Who will end up bidding for these numbers was a question asked by Mike Jankowski, a Washington, D.C. attorney representing the American Car Rental Association, whose members use many vanity numbers. Competitors could buy numbers at auction, or speculators could buy them and try to sell them at a profit.

In either case, the government shouldn't want the money. "It would be ill-gotten gains," Jankowski said.

Representatives of users concerned about the possibility of an auction had scheduled a meeting for last Friday to determine what they should do to squash the idea, he said. ■

Network Notes

Continued from page 1

without Internet hooks, so it was only useful to the Notes user community, which today numbers about four million.

"It's not that there's no market for Notes," said Gary Hickox, vice president of new business development at AT&T. "It's just that the Internet is where we are choosing to focus our resources."

AT&T is redeveloping a collaboration services strategy but does not yet have one to announce, Hickox said. He said the company is helping its existing Network Notes customers migrate to its own Easy World-Wide Web hosting platform or other public Notes services.

Despite the transition promises, users are left a bit in the lurch. "We're disappointed to the extent that we've invested a lot of time and energy into making this work," said Helen O'Connor, vice president and director of telecommunications for First Albany Corp. "But so has AT&T, and I'm sure they're just as disappointed as we are."

Lotus had pride and business at stake. "Of course we're not happy," said Larry Moore, senior vice president of Lotus' Interenterprise Computing and Emerging Products Group.

Some lay the blame on AT&T's lack of business prowess.

"AT&T didn't know how to sell [Network Notes], and the synergy with its other products wasn't there," said Steve Sazegari, managing director at Tele-Mac, a telecommunications consulting firm in Foster City, Calif.

ANCS lives on

Notes was originally designed to have links to AT&T's NetWare Connect Service (ANCS), a remote access platform that also is an access network to the Internet, AT&T EasyLink services, CompuServe, Inc.'s on-line services and other nets.

But the ANCS-Notes connection never materialized. The demise of Notes, however, "has no effect on ANCS activities," said Tibor Schonfeld, director of data and multimedia services at AT&T Bell Laboratories, which built the ANCS net.

Other Notes network operators were quick to defend the viability of public Notes services. Jim Freeze, director of application-based network services at CompuServe, which has offered its Enterprise Connect Notes service for two years, said CompuServe is "way ahead of [Notes] expectations."

WorldCom, Inc., a Houston-based firm dedicated to providing public Notes services, last week said 20% of all companies using Lotus Notes tap WorldCom's Notes services each day.

And new Notes networks are still going up. Infonet Services Corp. intends to have Notes services available in six months as part of its Global WorkPlace initiative announced today (see story, page 14).

Global network shattered

Still, the dissolution of Network Notes raises questions about the future of services from 12 international carriers building Notes networks. The carriers have been planning "a global network of Notes networks" with AT&T as the U.S. link.

"The pipe that would have been used to link all the international Notes services was to have been the Internet," Moore said.

But the next release of Lotus Notes containing 'Net hooks is not due out until midyear.

It would have taken AT&T another four to five months after that to get the services going — too far out in the competitive Internet market, Moore said.

Senior Writer Carol Sliwa contributed to this story.

WHAT THEY SAID THEN...



"This new service has the potential to change the way businesses do business, much as AT&T changed business when it introduced 800 service 27 years ago."

Alex Mandl, then-AT&T executive vice president, March 17, 1994



"By making Notes available on AT&T's public server network... we will bring workgroup computing to a new dimension."

Jim Manzi, then-chairman of Lotus, April 20, 1994

WHAT THEY SAY NOW...

"AT&T Network Notes initially was designed as a proprietary network, and the market has shifted to the Internet."

Kathleen Earley, vice president of AT&T EasyCommerce Services, Feb. 28, 1996



GroupWise

Continued from page 1

The company hopes to have its first beta out by March 19, the day Novell's annual Brainshare '96 customer conference starts, said Eldon Greenwood, director or product management in Novell's groupware division. The company plans to squeeze a second beta and a release candidate in by midyear, as well, he said.

"If they're going to get it out by the end of June, that's not a long beta cycle," said Gary Rowe, a principal with consultancy Rapport Communication. "To be kind, it's extremely aggressive. Notes was in beta for a little under a year, Exchange for over a year."

Stewart Nelson, Novell's groupware general manager, cleared some wiggle room for the company. "There are things that could happen that could push this thing to July. But I cannot imagine the circumstance that would push us to Q4," he said.

One customer, who asked not to be identified, said Novell has given him no indication of a second-quarter release date. "They said 'by the end of the year.' They kind of hemmed and hawed," he said. The customer said he's figuring on a fourth-quarter release.

Joe AuBuchon, program manager for information systems at McDonnell Douglas Corp. in St. Louis, said some of his assistants recently saw GroupWise XTD and told him they felt it was a long way from being production-ready. "I would say that we're doubting [a second-quarter release], and I really need it," he said.

One industry source, who suspects Novell could release GroupWise XTD in the third quarter, said the company does not have a clear, well-documented API between the client and server parts of the software.

Tom Austin, a research director at Gartner Group, Inc., said he is skeptical, too.

Gartner places the probability of a second-quarter release at 30%, a third-quarter release at 50% and a fourth-quarter release at 80%.

Greenwood said he is comfortable with Novell's release plan because the company did a good portion of its product redesign in 1993, "unlike Microsoft and Lotus, who have completely rearchitected for the next-generation messaging products." GroupWise already features client/server elements, he said.

Greenwood also asserted that the company does not believe in long beta periods, pointing out that previous GroupWise offerings have had three-month beta periods. ■

INSIDE THE GROUPWISE XTD BETA

- All features of GroupWise 4.1, including scheduling
- Document management
- Shared folders
- Database replication
- Personal address books

Note: Novell partner FileNet is currently conducting a separate beta test of workflow technology code-named Ensemble that will be plugged into the final edition of GroupWise XTD.

Microsoft Exchange pricing emerges

By Carol Sliwa

Redmond, Wash.

Microsoft Corp. will price its long-delayed Exchange Server groupware at a competitive $50 to $65 per desktop, *Network World* has learned.

This price is for the Enterprise Edition, which includes client and server software, as well as Internet mail, X.400, Microsoft Mail and Exchange multisite connectors, sources said.

Although individual connectors can be purchased separately, the Enterprise Edition might wind up being more cost-effective for customers.

A 50-user Enterprise Edition will cost about $3,250, or $65 per desktop. The 100-user edition will cost about $60 per desktop, and the 1,000-user package will cost roughly $50 per desktop, sources said.

Individual Exchange clients will be available for about $80, one source said. Individual servers will cost about $580; volume pricing can get as low as $250 to $400, sources said.

Large distributors now have pricing lists available, as Microsoft puts the finishing touches on the product that first went into test release in June 1994. One customer said Microsoft told him the final version will be released to manufacturing on March 13.

The inevitable comparison will be to Lotus Development Corp.'s recently released Notes groupware product. From a cost standpoint, an apples-to-apples comparison is tricky since the two products have different features and pricing schemes.

For example, Exchange will have only one client (aside from the one bundled into Windows 95), while Notes has three: a Mail-only client for $55; the Desktop client that can run custom applications for $69; and a complete client that can develop applications for $275. Prices are based on sales in quantities of 50.

A Notes single-processor server sells for $495, and a multiprocessor server is $2,295. ■

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Second-class postage paid at Framingham, Mass., and additional mailing offices. Posted under Canadian International Publication agreement #0385662. *Network World* (USPS 735-730) is published weekly, except for a single combined issue for the last week in December and the first week in January by Network World, Inc., 161 Worcester Road, Framingham, Mass. 01701-9172.

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ISSN number: 0887-7661.

In memory of those 800-pound, high-level de jure standards

After a long illness and a prolonged fight for survival, high-level de jure standards as we have known them are dead. Or at least moribund.

That's right, you read it here first. Those detailed, quasi-legal specifications that define the features and functionality at the applications level are going the way of the dodo.

This is both good and bad news. Good news because most of the de jure standards (VIM is one that comes to mind) are huge, 800-pound, gorilla-like architectures that are hell to understand, let alone implement. Worse still, underneath they turn out to be 8-ounce stacks of cards with 100-ton management systems. Their demise will not be sad news to many net managers.

The bad news is we now have a deluge of market-driven de facto standards taking up the slack. In such a dynamic environment, figuring out which horse to bet on is extremely difficult.

The problem for net managers has always been whether to bet on de jure standards or de facto ones.



Mark Gibbs

But the problem for network managers has always been whether to bet on de jure standards or de facto ones. De jure standards are those defined and set, for example, by the ISO, IEEE and ANSI.

Now it must be admitted that some de jure standards have passed the test of time. . .so far. X.400 and X.500 may be the only lasting legacy of Open Systems Interconnection, for example. But the problem with de jure standards is that they have always been complex specs designed by committees as compromises that address the widest range of needs.

But now even de jure standards riding the wave of popularity are in trouble. Consider the World-Wide Web Consortium (W3C) and its process to standardize HTML. It is trying to wrap up Versions 2 and 3 at the same time. (I remember reading a meeting report where a W3C committee was trying to reach a conclusion over something as simple as whether a comma or a semicolon should be used. The report then noted: "At this point, a religious war broke out.")

The message here is don't hold your breath while waiting for a resolution.

De facto standards are those created by the marketplace — either by individual vendors (Netscape with its Secure Sockets Layer) or in groups (Commerce-Net with its competing Secure HyperText Transfer Protocol). There are also user-driven de facto standards, such as the Desktop Management Interface from the eponymous DMI Group. (Actually, that's the only example I could think of.)

We can subdivide the de facto standards into strong and weak. For example, there are strong standards promoted by powerful vendors such as Microsoft, Sun, Cisco and Novell. Weak standards are embodied in products that offer openness, but where the vendor can't push the market into accepting the standard.

As an aside (which I'm very good at), many potentially strong de facto standards fade over time. This is what happened to Lotus' VIM and Novell's MHS.

The greatest force in declawing de jure standards and promoting de facto ones has been the Internet. The intense interest and use of the 'Net has forever changed the standards landscape.

Just consider the Web. Its evolutionary rate has been astounding: 130 servers in 1992 to about 120,000 today! You've heard of dog years (roughly seven to one)? We now have 'Net years (about 10 to one) and Web years (roughly 25 to one).

By way of example, in this environment, the slow-grinding de jure deliberations of W3C have been completely overshadowed by Netscape's unilateral de facto implementation of custom extensions that successfully met user demands. The justification for bucking the standards body has been in the result — market acceptance by the millions.

This kind of market drive defines the future of standards. De facto standards will win. They are, without doubt, the dominant standards force of the future.

Gibbs would love to hear from you. Drop him a note at mgibbs@gibbs.com, or call (800) 622-1108, Ext. 504.

Client/server should take a tip from Vidal Sassoon

Time-out for a serious question. Which of the following could you not live without: a PC or a blow-dryer?

According to a recent national poll, having the right hairdo apparently is more important to most Americans. But both items ranked low compared to the top three choices: automobiles, lightbulbs and telephones. Televisions, aspirin and microwaves came next.

A key ingredient for these no-brainer picks was ease of use.



Dave Buerger

To bring this closer to home, I took a similar, statistically accurate poll of network managers. They have their own short list of things they can't imagine living without. Some at the top of the list include:

- End users who put devices or applications on the network without permission. The subsequent crash makes network managers feel needed.
- Constant badgering for adds, moves and changes. These interrupt-driven headaches keep network managers away from the desk and having to do real work.

One example of system technology that's choking on its own complexity is client/server.

- Dot-one software upgrades. Software that actually works frees up time to do more adds, moves and changes.
- 24-hour-a-day, seven-days-a-week toll-free telephone support lines. Network managers need them to undo damage caused by end users who keep sticking weird stuff on the network.

Network users also have an interesting can't-do-without list:

- Networks without any security restrictions. Passwords and access rights make using the network such a bother.
- Windows 95. The new operating system makes it a snap to hide a (fill in the blank) Web page with a spreadsheet. The big guy never knows what is really going on.
- A LAN manager who never rejects a plea for help — even if the dumb user claims, "I don't know who networked the PC; it was like that when I got here."

OK, you're right. Network managers claim an odd list of favorites, whereas end users' choices are about simplifying life, just like the consumer picks in the national poll. Simplicity is one key factor in making any product a popular winner.

Network managers and other IS professionals don't always think of the systems they create as products. They should. People hate using complicated systems. Even IS professionals have a hard time building and managing complex technology. Simple system designs are always better and less expensive.

One example of system technology that's choking on its own complexity is client/server. Project rollouts based on client/server are stalled, according to research by Sentry Market Research of Westborough, Mass.

According to a Sentry five-year study, most client/server projects cost more and take longer to create than projected. Expectations for scalability have declined due to the technology's complexity, and the need for training end users has not disappeared. In short, client/ server has turned into a disappointing, complicated shell game.

What if, by some cruel cosmic joke, today's idea of client/server never happens? What if a more simple development environment appeared that requires a fraction of client/server's tools and technical overhead? What if using this scheme required no special training?

Don't look now, but this transformation is happening under our noses. It's Web server and browser technology used on internal corporate networks. These intranets are powerful because they are simple compared with normal client/ server. The intranet's page metaphor is grasped by users in a flash.

No technical mumbo jumbo here. Intranets are made for the masses of normal workers.

Now is the time to seriously consider switching to an intranet development strategy. Think simple and you'll make a winner. Intranet applications may never beat the car's popularity, but they might edge out blow-dryers.

Buerger is a networking industry consultant and writer in Atlanta. He can be reached at dave@buerger.com.

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AXON Networks

AXON's RMON-compliant, enterprise traffic management solutions dramatically improve the performance of your network and your network management team. In addition to their RMON-based LANServant products, AXON is demonstrating their new, RMON 2-based Traffix Manager and FlexiProbe 6000, winner of the Data Communications Hot Products Award for 1996. AXON's award-winning products and technology have been adopted by top network vendors as the "OEM's RMON Solution of Choice."

Cabletron Systems

Cabletron Systems is a leading developer, manufacturer and marketer of standards-based Ethernet, Token Ring, FDDI and ATM networking solutions. Adhering to a strategic framework known as "Synthesis", Cabletron's product line provides the building blocks necessary to implement and manage a globally distributed platform of interconnected local and wide area networks. With Synthesis, customers are assured of a smooth migration from today's connectionless, router-based networks to the connection-oriented, switched virtual networks of tomorrow.

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Founded in 1979, 3Com Corporation pioneered the data networking industry. Today, 3Com offers customers a broad range of ISO 9000-compliant global data networking solutions that include routers, hubs, remote access servers, switches and adapters for Ethernet, Token Ring, and high-speed networks. 3Com is headquartered in Santa Clara, Calif. and maintains worldwide research and development, manufacturing, marketing, sales and support capabilities.

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Harris Network Management (HNM) is a powerful, multi-protocol network management system designed for centralized or distributed networks. HNM specializes in the use of customizable graphical displays for total heterogeneous network integration and problem resolution.

ISICAD

Founded in 1978 with headquarters in Anaheim, California, ISICAD is the industry-leading supplier of physical network management solutions. The COMMAND product line is a suite of integrated, scaleable software applications for the management of the physical infrastructure of the network. The company offers a complete solution with a range of integration services including technical consulting, training, and implementation, to help customers worldwide manage their networks.

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ManageWise™ is Novell's complete management solution. ManageWise effectively manages your network's core components, including desktops, servers and network infrastructure. Novell is the world's leading networking software provider. Novell software provides the infrastructure for a networked world, enabling our customers to connect with other people and the information they need, anytime and anyplace. Novell partners with other technology and market leaders to help customers make networks a part of their everyday lives.

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TechForce is a support integrator focusing on 7 x 24 technical support for channel networking, data networking, and Internetworking TechForce also provides remote problem resolution, national on-site support, logistics management, and rapid parts delivery.

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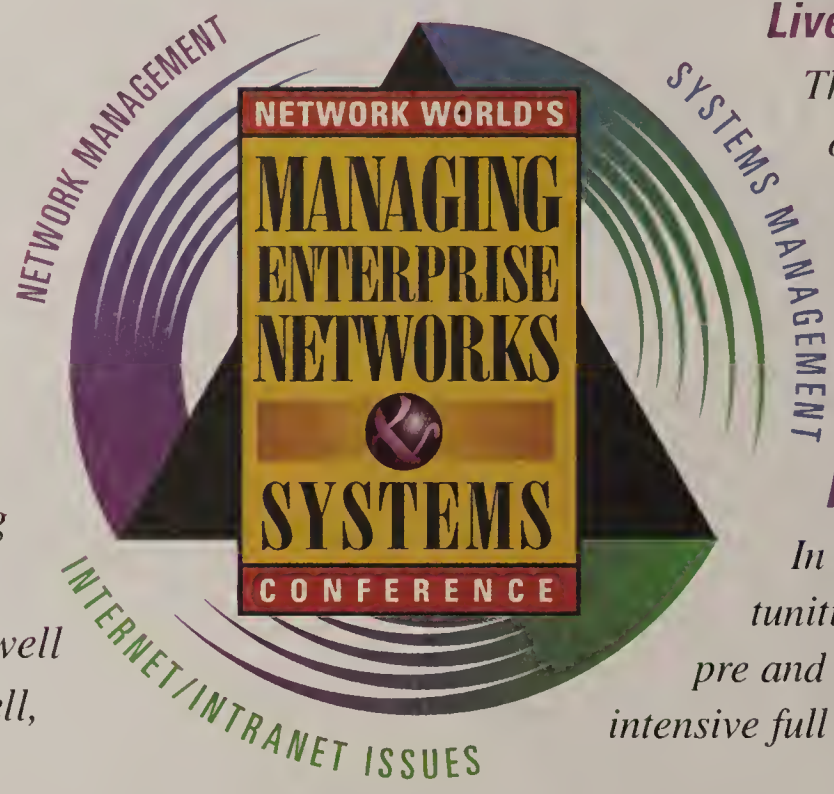
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